ANNUAL REPORT
2010-11

Vallabhbhai Patel Chest Institute
University of Delhi, Delhi, India

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From the Director's Desk

I have great pleasure to present the Annual Report of the year 2010-11. An important milestone in the history of the Institute is achieved this year by the introduction of DM course in Pulmonary Medicine which has been permitted by the Medical Council of India, Government of India and University of Delhi with an intake of two students every year. Another important course approved by the University of Delhi is a Diploma course in Allergy and Clinical Immunology. The inauguration of the "National Centre for Respiratory Allergy, Asthma and Immunology" by Prof. P.N. Tandon, President of the National Brain Research Centre Society on 12th February 2011 is an important landmark as Vallabhbhai Patel Chest Institute is well known globally for its contributions in the field of respiratory allergy. We have already started the research activities of the Centre with focus on community based research in allergy and asthma. Establishment of a "Clinical Pharmacology Unit" was another addition to the Institute during this year.

The 12th "Professor Raman Viswanathan-VPCI Oration", started in 1999 to perpetuate the memory of the Founder-Director of the Institute, was delivered by Prof. M.K. Bhan, Secretary, Department of Biotechnology, Government of India on 6th April 2010. The 6th "Prof. Autar Singh Paintal Memorial Oration" was delivered by Prof. Chulani Tissa Kappagoda, Professor in the Division of Medicine, University of California, Davis, USA on 24th September 2010. The Institute organized two international conferences this year. The first one was the International Conference on Pathology of Environmental Lung Diseases (POED 2010) on 29th and 30th November 2010 and this was organized in collaboration with the Pulmonary Pathology Society of India and the Pulmonary Pathology Society, Division of American Society of Investigative Pathology and a workshop on "Transbronchial Lung Biopsy Interpretation" was also held on this occasion. The second was the first International Conference of the South Asia Association of Allergy, Asthma and Clinical Immunology on 12th and 13th February 2011.

Fulfilling one of the mandates of the Institute, many scientific programmes were organized during this year. Important among them are National Symposium on "Sleep Apnea: an Update" on 5th April 2010 on the occasion of 61st Foundation Day celebrations, Workshop on "Nuts and Bolts of Sleep Laboratory" on 6th April 2010, Training in "Behavioural Counselling-Tobacco Cessation" on 22nd July 2010, National Symposium on "Translational Research in New Drug Development" on 12th January 2011, National Symposium and Workshop on "Yogic Management of Pulmonary Diseases" on 27th and 28th January 2011, 36th Workshop on "Respiratory Allergy: Diagnosis and Management"from 7th to 11th February 2011 and 2nd Annual Conference of the International Association of Medical and Pharmaceutical Virologists from 3rd-5th March 2011.

Postgraduate medical education is one of the thrust areas of the Institute. Students are trained for MD degree in Pulmonary Medicine, Biochemistry, Physiology, Microbiology and Pharmacology and for PhD degree in Chest Medicine and allied sciences. In addition, a diploma course in Chest Diseases is also conducted. The research contributions from the Institute are widely acclaimed and these are published in journals of repute. The detailed research activities of various departments are provided in the subsequent pages of this report.

The Viswanathan Chest Hospital attached to the Institute is a tertiary care Chest Hospital with state-of-the-art equipment. A new 64 multi-slice CT scanner was installed in the hospital this year. A large number of patients from Delhi and other parts of the country utilize the facilities available in the hospital. Eight-bedded Respiratory Intensive Care Unit, Cardio-pulmonary Rehabilitation Clinic and Tobacco Cessation Clinic are integral part of the Institute providing excellent diagnostic and treatment facilities to thousands of patients thronging the hospital for relief.

Dr V.K. Vijayan
Director

"National Symposium on Translational Research in New Drug Development" held on 12th-13th January 2011. ***Dignitaries on the dais (left to right)*****: Dr V.K. Vijayan, Director, VPCI; Prof. P.N. Tandon, Chairman, Governing Body, VPCI; Dr G. Ilavazhagan, Director, Defence Institute of Physiology and Allied Sciences, DRDO, Delhi; Prof. P.L. Sharma, Director Clinical Research, ISF College of Pharmacy, Moga, Punjab; Dr B. Dinesh Kumar, General Secretary, Indian Pharmacological Society; Prof. A. Ray, Organising Secretary of the Symposium.**

"2nd Annual Conference of International Association of Medical & Pharmaceutical Virologists" (IAMPV) held on 3rd-5th March 2011. ***Dignitaries on the dais (left to right)*****: Dr V.K. Vijayan, Director, VPCI; Dr S. Rajarajan, President, IAMPV; Prof. P.N. Tandon, Chairman, Governing Body, VPCI; Prof. S.P. Thyagarajan, Pro-Chancellor (Research), Sri Ramachandra University, Porur, Chennai; Dr P. Gunasekaran, General Secretary, IAMPV; Dr Madhu Khanna, Organising Secretary of the Conference.**

ANNUAL REPORT (2010-11)

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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.

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.
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.
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 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 per year from the academic year 2011-12.

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, Respiratory 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. Usha Rao** *(13.01.2011 onwards)*
Dean, Faculty of Medical Sciences, University of Delhi	**Prof. Kiran Mishra**
Three members nominated by the Ministry of Health and Family Welfare, Government of India, New Delhi	**Shri Naved Masood** Special Secretary and Financial Advisor **Shri Debasish Panda** Joint Secretary **Dr R.K. Srivastava** 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. Ashok Shah** *(till 02.11.2010)* **Prof. Mridula Bose** *(03.11.2010 onwards)*
One Reader or Lecturer of the Institute by rotation according to seniority for a period of one year	**Dr Mujeeb-ur-Rahman** *(till 02.11.2010)* **Dr Kavita Gulati** *(03.11.2010 onwards)*
MEMBER-SECRETARY	
Director, Vallabhbhai Patel Chest Institute University of Delhi, Delhi (Ex-Officio)	**Dr V.K. Vijayan**

Standing Finance Committee

Shri Naved Masood — *Chairman*
Special Secretary and Financial Advisor
Ministry of Health and Family Welfare
Government of India
Nirman Bhawan
New Delhi

Dr V.K. Vijayan — *Member-Secretary*
Director
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. S.K. Bansal — *Member*
Department of Biochemistry
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

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

Prof. S.N. Gaur — *Member*
Department of Respiatory Medicine
V.P. Chest Institute
University of Delhi
Delhi

Ethics Committee

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

Dr V.K. Vijayan — *Member-Secretary*
Director
V.P. Chest Institute
University of Delhi, Delhi

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

Prof. Sanjai Bhatt — *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 - 110062

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 - 110029

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 - 110067

Dr. B.B. Batra — *Nominee of CPCSEA*
A-36, Savita Vihar (Non Scientific Socially Aware
New Delhi - 110066 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-110095

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

ORGANISATIONAL STRUCTURE

DIRECTOR

V.K. VIJAYAN, MBBS, DTCD, MD, MAMS, PhD, DSc, FCCP, FNCCP (I), FCAI, FICC, FAMS

Biochemistry

H.G. Raj, MSc, PhD, CChem, FRSC
Professor

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

Respiratory Allergy and Applied Immunology

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

Balakrishnan Menon, MBBS, DMRD, MD
Associate Professor

Respiratory Medicine

Unit - I

V.K. Vijayan, MBBS, DTCD, MD, MAMS, PhD,
DSc, FCCP, FNCCP (I), FCAI, FICC, FAMS
Director

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

Unit - II

S.N. Gaur, MBBS, MD, FCCP, FNCCP (I), FCAI
Professor

Respiratory Virology

(Mrs) Madhu Khanna, MSc, PhD
Associate Professor

Viswanathan Chest Hospital
Officer-in-Charge
V.K. Vijayan

Library

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

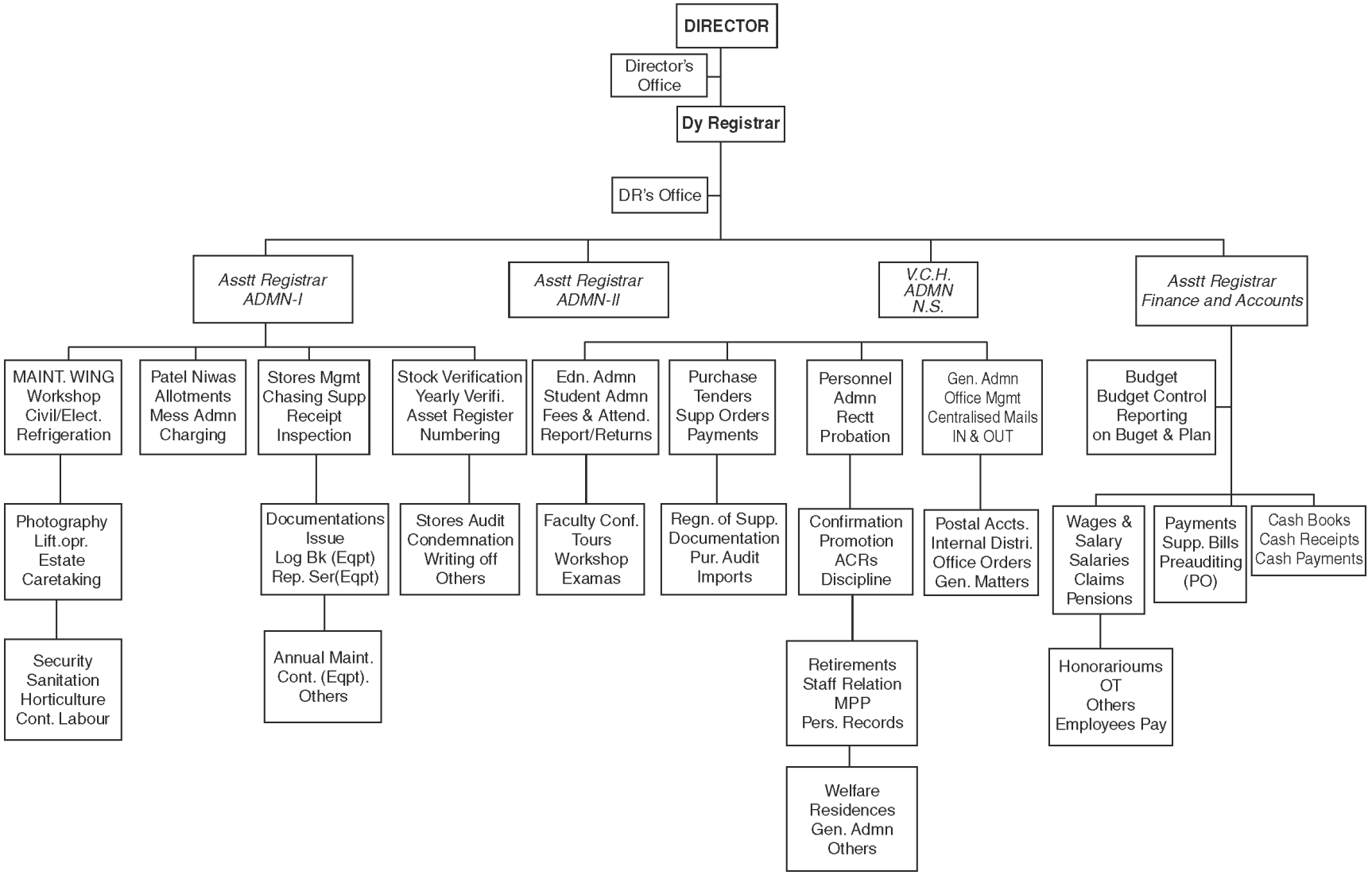
Animal House

Rajinder Bajaj, BVSc & AH
Veterinarian

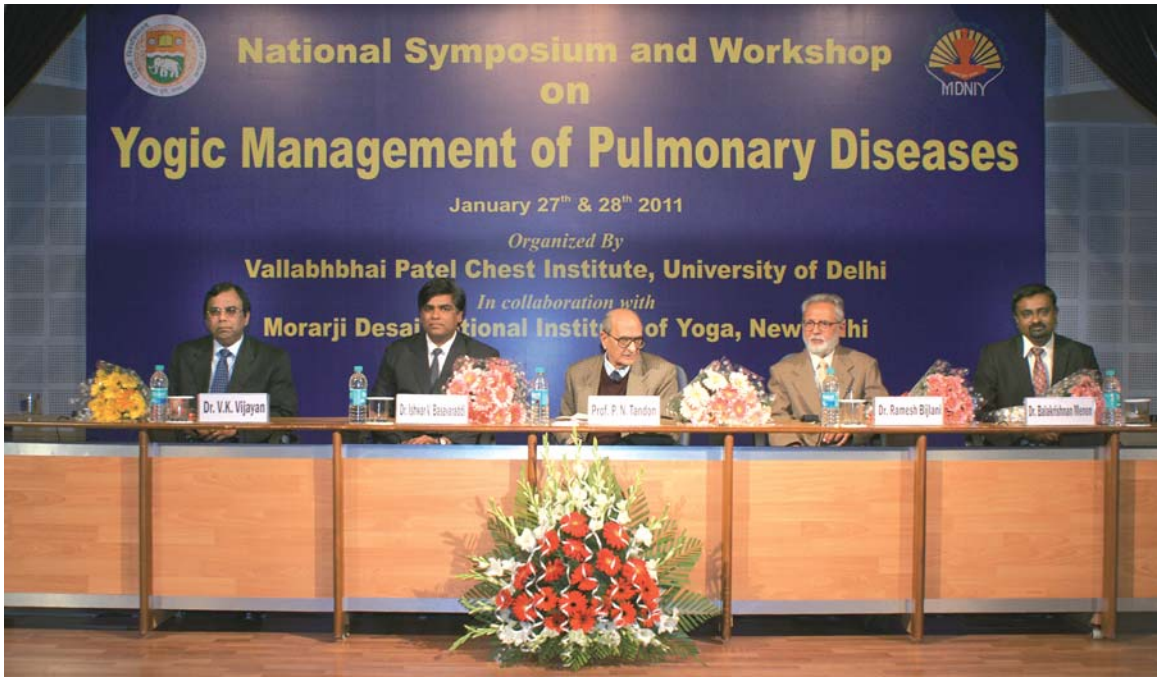
Administration

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

ADMINISTRATIVE STRUCTURE



"National Symposium on Sleep Apnea: An Update" held on 5th April 2010. ***Dignitaries on the dais (left to right)*****: Dr V.K. Vijayan, Director, VPCI; Prof. P.N. Tandon, Chairman, Governing Body, VPCI; Prof. K. Ravi, Organising Secretary of the Symposium.**



"National Symposium and Workshop on Yogic Management of Pulmonary Diseases" held on 27th-28th January 2011. ***Dignitaries on the dais (left to right)*****: Dr V.K. Vijayan, Director, VPCI; Dr I.V. Basavaraddi, Director, M.D.N.I.Y., New Delhi; Prof. P.N. Tandon, Chairman, Governing Body, VPCI; Dr Ramesh Bijlani, Former Professor, Department of Physiology, A.I.I.M.S., New Delhi; Dr Balakrishnan Menon, Organising Secretary of the Symposium and Workshop.**

CENTRAL FACILITIES

Viswanathan Chest Hospital

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

1. Respiratory Medicine (Two units),
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 2010-11, 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	:	11513
Number of visits of old patients to OPD	:	53129
Total		**64642**

Total number of indoor patients

General Wards	:	2163
Emergency Wards	:	2064
Total		**4227**

Emergency treatment provided	:	17405
Total number of patients treated in ICU	:	371
Invasive ventilation	:	106
Non-invasive ventilation	:	227
Intensive care	:	38

Number of specialised investigations done

Pulmonary function tests	:	20216
Arterial blood gases	:	3291
Bronchoscopy	:	184
Bronchoalveolar lavage	:	68
CT scans	:	2258
Ultrasound examinations	:	596

X-rays	:	23644
Electrocardiogram	:	6121
Polysomnograms	:	68
HIV testing	:	270
Serum IgE test	:	1084
Skin tests	:	1463
Clinical biochemistry	:	30538

National Centre of Respiratory Allergy, Asthma and Immunology

During the year, the Institute has established the National Centre of Respiratory Allergy, Asthma and Immunology (NCRAAI). The Centre was inaugurated by Prof. P.N. Tandon, Chairman, Governing Body (VPCI) on 12th February 2011. The Centre is determined to conduct extensive research and training on various aspects of allergy and asthma – their aetiopathogenesis, diagnosis and treatment. Accordingly the Centre has prepared a Road Map to accomplish its task. Recently, a book titled, "*An Atlas of Common Allergens*" has also been published in this context.

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 and obstructive sleep apnea (OSA) who are disabled in activities of daily living (ADL) due to shortness of breath (SOB). These patients often have associated muscle deconditioning due to malnutrition, long term drug usage and chronic disease process and are therefore limited in their functional capacity.

In the Cardio-pulmonary Rehabilitation Clinic, patients are enrolled for the supervised programme where they undergo exercise training and education sessions. The programme consists of two phases: Initial ***Intensive*** phase and later ***Maintenance phase***. In the Intensive Phase, patients undergo 80 - 100 minutes of individualized supervised training sessions, three-five days a week, for a total of 6 - 8 weeks. The training session includes inspiratory muscle training and exercise training for upper & lower limbs. Training of the upper limbs included arm-ergometry and free weights. Lower limbs´ training includes leg-ergometry, treadmill walking and endurance walk. Simultaneous upper and lower limb training is performed on Semi-Recumbent Whole Body Exerciser. Patients also undergo educational sessions on topics such as breathing retraining, energy conservation, lung health, medications and stress management.

Once the patients complete the Intensive phase, they are discharged from the program and advised Home Programme. Patients are also advised to enroll in the Maintenance phase, where they attend supervised training sessions once or twice a week.

Patients who are unable to attend supervised training sessions are given individualised Home Programme and are advised to maintain their Activity Record. These records are assessed during their scheduled follow-up visits.

Cardio-pulmonary Rehabilitation Clinic Timings:

- Monday to Friday (9.00 a.m. to 1.00 p.m.):
  - Exercise and education sessions for enrolled/referred 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 2010-11:

• Explained Breathing retraining	:	228
• Enrolled for supervised programme	:	41
• Chest Physiotherapy	:	3704

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 libraries in the field of Pulmonary Disease and Allied Sciences having 9,893 Books, 19,889 bound Journals, 130 CD's, 458 Thesis and 97 National and International Reports. A total of 100 Journals (94 International and 06 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 five 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 surfing and access has been provided right on the desktop of each Faculty Member through LAN and ISDN connectivity with 128 KBPS line from 8.00 A.M. to 7.00 P.M. on all the seven days of the week. 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 University of Delhi 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 Reports and other publications of the Institute.

The Division has also started maintaining the Institute´s Website (www.vpci.org.in). Two new links **[**i. **Employees Corner** (General informations, Pension Payments) and ii. **Circular/Notification]** were added during the year. The RTI Act, 2005 manual which is available in our Website has also been prepared.

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

Bronchial asthma is a prevalent disease in India and is on rise. It is characterised by persistent airway inflammation and hypersensitivity leading to airway constriction and obstruction. Treatment of asthma is based on the clinical assessment of the disease. The therapeutics for asthma treatment are mainly classified into three categories which include *i)* β_2 agonists (as bronchodilators), *ii)* corticosteroids and *iii)* antileukotriene therapy. The main stay of the therapy is the use of bronchodilators and corticosteroids. The bronchodialtors such as albuterol (salbutamol) act through β_2 adrenoceptor (ADRB2) and corticosteroids through corticotropin releasing hormone receptor 1 (CRHR1). The response of the patient to these drugs varies, and some patients do not respond to a given drug, which may be due to the genetic variations in these genes.

The studies on genetic polymorphism in asthma in India, particularly on identifying the genetic variations in responders and non-responders to a drug, are limited except one or two scattered papers. Hence, a strong need was felt to conduct a systematic study on pharmacogenomics of asthma in Indian population with a well defined approach. This study will help to identify the known genetic variations, in ADRB2 gene, as well as establish new facts on genetic variations in CRHR1 gene and their genotypic/phenotypic relationship in responders and non-responders to β_2 agonist viz. albuterol (salbutamol) and corticosteroid (budesonide).

For the study, blood samples were collected from healthy subjects and patients of bronchial asthma as per the selection criterion, followed by isolation of DNA, amplification of various regions of ADRB2 gene, and finally sequencing of the amplicons. The patients were treated with salbutamol or budesonide. As preliminary study, the data of only few healthy subjects and patients, suggest the presence of SNPs in ADRB2 gene in healthy to be at -1343 (A/G), -468 (G/C), -367 (C/T), -40 (C/T), 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 studies on larger sample are being conducted.

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. The Department takes care of indoor and outdoor patients´ records. Additionally, it compiles reports to Government of Delhi, Government of India, UGC, etc., periodically pertaining to the institute.

Cardiorespiratory Physiology

Research

1. Pulmonary function in normal children in Delhi region: development of reference standards for spirometry

Data analysis of the study to develop reference values for spirometric parameters in children in Delhi region has been completed. The study was funded by the Indian Council of Medical Research. Nearly 700 normal children in the age group 6 to 18 years were included. A questionnaire was answered by the parents and the children were examined to ensure that these were free of any respiratory or other systemic disease. Spirometry was carried out on a portable spirometer using a Lily Pneumotach as per the standardisation guidelines of the American Thoracic Society-European Respiratory Society. FVC and FEV_1 were found to increase linearly with age and height. Inclusion of weight in the equation leads to further improvement of the prediction. These parameters are greater in males than in females. However, the flow rates in the two genders are comparable.

These equations will be of immense value in research and in clinical practice including diagnosis and management of respiratory diseases such as bronchial asthma and COPD. This study will also provide inputs to manufacturers to include these as prediction equations in equipment software. A major gap in information on lung function in Indians has been met.

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

Prediction equations developed with standardised methodology with similar equipment and techniques are not available for adult Indian population. This is a major limitation in clinical diagnostic work and research in chest diseases. A multicentric study coordinated by the Institute and funded by the Indian Council of Medical Research is in progress. Four centers have been selected to develop regression equations for spirometric parameters, lung volumes and diffusion capacity. These are as follows: North (Delhi) South (Bangalore) East (Kolkata) and West (Mumbai). After screening by chest radiograph and physical examination, spirometry, static lung volume measurements and diffusing capacity measurements 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 250 subjects have been studied in Delhi.

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

Epidemiological studies have shown that patients with chronic obstructive pulmonary disease (COPD) are more likely to die of cardiovascular than respiratory causes. One of the possible mechanisms is the occurrence of autonomic dysfunction in COPD. Heart rate variability (HRV) has emerged as an excellent tool to study autonomic dysfunction. A study is currently in progress to study the phenomenon of 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 are being recorded. The study will provide conclusive evidence on the existence of autonomic dysfunction in COPD and is expected to yield an explanation for increased cardiovascular mortality in this disease. Preliminary data suggests a reduced overall power of HRV with impaired parasympathetic response.

Clinical Biochemistry

Research

1. Investigations on the role of polyphenolic acetate and calreticulin in hyperacetylation induced apoptosis in mice

Epigenetics is defined as heritable changes in gene expression not associated with alterations in DNA sequence. DNA methylation, histone modifications, chromatin remodelling factors, and noncoding regulatory RNAs are all known to be involved in epigenetic regulation of chromatin structure and gene activity. These epigenetic regulatory processes are considered critical components of normal development in cellular differentiation, organogenesis, and aging and there is mounting evidence that epigenetic abnormalities are causative factors in several diseases, including cancer. Histone modifications occur mainly by Acetylation, Phosphorylation, Ribosylation, Methylation and Ubiquitin binding. Molecular mechanisms in cell transformation processes increasingly indicate that cancer is also an epigenetic disease and it has been shown that the Imbalance of acetylation and deacetylation levels results in development of malignancies. Protein acetylation in cells is regulated by synchronised activities of histone acetyl transferases (HAT) and histone deacetylases (HDAC) which have been implicated in homeostasis of DNA repair, cell cycle delay, apoptosis and senescence. Previous studies from our laboratory had demonstrated the modification of certain proteins such as Glutathione S transferase, NADPH cytochrome P-450 reductase, Nitric oxide synthase catalysed by transacetylase which was later identified as Calreticulin (CRT) now known as Calreticulin transacetylase (CRTAase). Elucidation of the role of histone acetylation in cell by the novel mechanism *i.e. via* CRTAase, thus, would hold key to the design of target oriented drugs in cancer therapy including lung tumourigenesis.

In our plan of work transacetylase activity of CRT was to be proved in tumour cells in mice by analysing the effect of valproic acids and various polyphenolic acetates on tumour cell by studying apoptosis in peritoneal fluid cells in tumour model of mice as a result of histone hyperacetylation. Various polyphenolic acetates and their combinations with calreticulin and HDAC inhibitors were used in the studies. We observed whether these combinations lead to increased apoptosis in the cancer cells or not, thereby exploring the role of polyphenolic acetates and calreticulin as potential candidates intended for their use as target oriented chemotherapeutic and chemopreventive drugs acting by the above mentioned novel mechanism. As enzymes have been used for diagnostic purpose mainly but their use in therapeutics will also be explored in cancer treatment, which is a novel concept in chemotherapy.

Objective of the study:

- To establish transacetylase function of calreticulin.
- To establish mice tumor model.
- To study calreticulin transacetylase catalysed modification of functional protein histone using various polyphenolic acetates in the mice tumour model.
- To elucidate apoptosis as a consequence of the hyperacetylation by the novel mechanism in the above model.

Work done:

All animal experiments were performed following approval of the Institutional Animal Ethics Committee [IAEC]. The study design included total number of 48 mice, which were divided into 12 groups of 4 mice each. The mice were injected with 0.1mL of Ehrlich Ascites tumour cell line (EAT) by I.P route. It is a mammary gland tumour. 0.1mL of EAT cell line contains 15-20 million tumour cells. Then after 10 days of injection the cells entered into exponential phase. After treating the animals with EAT the cell viability was checked by Trypan blue exclusion assay and 99% cells were found to be viable.

These EAT bearing mice were given different drugs including various polyphenolic acetates compounds in doses = 300mg/kg dissolved in 0.1 mL DMSO [6-Acetoxy Quinolone (6-AQ), 7,8-Diacetoxy-4-Methyl Coumarin (DAMC) and Ellagic acid peracetate (EAA)], Valproic acid and purified, recombinant calreticulin

and their combinations by Intra peritoneal route (I.P); 0.1 mL DMSO was given to control group. After 26 hrs of the above treatment, 2mL of peritoneal fluid was aspirated from mice of all the above groups and were studied for the extent of apoptosis in the peritoneal cells. And transacetylase activity of calreticulin *in vitro* was also established by Glutathione S transferase Assays (Inhibition of GST) prior to its use in our studies.

Apoptosis Studies: were carried out by analyzing the morphological features of cells on Fluorescent microscopy using DNA specific fluorochrome 4', 6-diamidino-2-phenylindole (DAPI) to stain slides and appearance of hypo-diploid (sub G1) population in flow-cytometric measurements of DNA content.

Statistical Analysis: The data is presented as the mean ± S.E.M and statistically significant differences among groups has been analysed by One Way Analysis of Variance followed by Post Hoc Multiple Comparison Test (Bonferroni's Multiple Comparison Test). A p value of less than 0.05 was considered statistically significant.

Results

a. The data shows that as compared to the control, VA (HDAC inhibitor), DAMC, EAA and, 6AQ all lead to increase in apoptotic cells analysed by fluorescent microscopy and the increase was found to be highly significant in VA and DAMC.

b. Flow cytometric analysis showed the increase in apoptotic cell stage (P5) in the VA as well polyphenolic acetates *i.e.* DAMC, 6AQ, EAA, and the increase was found to be highly significant in VA and 6AQ and DAMC.

c. Calreticulin (CRT) alone compared to control did not show any significant increase by both the methods.

d. Using various combinations we found out that the groups (DAMC + CRT) and (DAMC + CRT + VAL) both showed significant increase in apoptosis by both flow cytometry cell cycle analysis as well as by flouroscent microscopy.

e. On the other hand EAA alone did not show significant increase but showed significant increase by both the methods when used in combination with VA and CRT.

f. 6AQ showed significant increase alone as well as in combination with CRT and also with CRT + VA combination, when compared to control group by flow cytometric which was also confirmed by fluorescent microscopy.

Thus, our results have clearly demonstrated that various polyphenolic acetates especially 6-Acetoxy Quinolone (6-AQ), 7, 8-Diacetoxy-4-Methyl Coumarin (DAMC) are highly potent in increasing apoptosis probably using cell's inherent CRTAase thereby leading to hyperacetylation induced apoptosis and the extent of acetylation in histone.

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

We have further extended our studies to assay CRTAase in human non-small cell lung cancer A549 cell line culture tumour cells *in vitro* and CRTAase catalysed modification of Histone by various combinations of PAs [Ellagic acid peracetate, Querecitin Pentaacetates, 6-Acetoxy Quinolone and 7, 8-Diacetoxy-4-Methyl Coumarin (DAMC)] and Valproic acid as HDAC inhibitor. Apoptosis studies are being carried out by florescent microscopy and flow-cytometric analysis. Extent of histone protein acetylation is being determined by Western blotting using commercially available specific Anti-Acetyl Histone (Ac-Lys) H3 and H4 Antibodies.

OBJECTIVES

- To establish transacetylase activity of purified calreticulin.
- To establish human non-small cell lung cancer A549 cell line culture.
- To assay calreticulin level in tumour cells.
- To study calreticulin transacetylase catalysed modification of functional protein histone using various polyphenol acetates and HDAC inhibitors.

- To study apoptosis as a consequence of the hyperacetylation by the novel mechanism in all the treatment groups and to correlate it with other parameters

Work done:

Cell line establishment

The culture of the tumor cell lines has been established. Human non-small cell lung cancer A549 cell line (NSCLC, lung adenocarcinoma) is obtained from NCCS, Pune, India and maintained in DMEM medium containing 10% (v/v) fetal calf serum, penicillin (100 U/mL) and streptomycin (100 µg/mL) in a humidified 5% CO_2 atmosphere. Logarithmically growing cells are used in all experiments.

We have also obtained purified recombinant calreticulin from clones from the nematode *Haemonchus contortus*, GI parasite in sheep and goat using various steps involving preparation of media, inoculation, induction, sonication and affinity chromatography (Ni-NTA slurry) by Elution with different conc. of imidazole and assessed its purity by and SDS-PAGE and Western blot. We have established the transacetylase activity of calreticulin *in vitro* by glutathione S transferase assays (Inhibition of GST). We have assayed calreticulin level in tumour cells and further studies are going on.

3. 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.

Objectives:

- Quantification of various metalloproteinases in COPD and smokers.
- Identification of single nucleotide polymorphisms (SNPs) in the genes encoding various metalloproteinases linked to COPD susceptibility in smokers.
- To study the correlation between the SNPs, gene products, smoking and COPD.

Work plan:

To unravel the molecular process leading to airway obstruction in smokers the following parameters are being planned to be studied in all the subjects in the study to achieve the above objectives:

- To study single nucleotide polymorphism in ADAM33, MMP1, MMP9 and MMP12 genes in all the subjects in the study.
- Estimation of ADAM 33 gene product in blood of all the subjects.
- Estimation of MMP1, MMP9 and MMP12 gene products in blood of all the subjects.
- Lung function test – spirometry.

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.

Three main groups are formed on the basis of smoking history and spirometry:

Ist group: Smokers without co-morbidity with normal PFT: Total 60 subjects.

IInd group: Smokers with Spirometry proved COPD and without any other co-morbidity: Total 60 subjects with COPD phenotypes as described above.

IIIrd group: Healthy non-smoker controls: Total 60 subjects.

Polymorphisms in metalloproteinases genes, ADAM33, MMP1, MMP9 and MMP12 and their association with smoking and COPD studies are under investigation in the undergoing project, primers are designed using appropriate software and initial studies have been done using gene runner programme.

Work done:

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. Relevant clinical history was considered and complete clinical examination was done for all the subjects. (We have prepared the questionnaire and consent forms in Hindi as well as in English). After taking consent from the subjects and filling up the questionnaire, chest radiograph 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 products and PCR analysis.

I. Application of bioinformatics as a tool to decipher the genes sequence of ADAM33, MMP1, MMP9 and MMP12 genes. Initially nucleotide sequence of the ADAM33, MMP1, MMP9 and MMP12 genes was determined and Blast analysis was performed at the site www.ncbi.nlm.nih.gov/blast to predict *in silico* the function of the gene.

II. DNA extraction and genotyping: Genomic DNA was extracted from the fresh whole blood using a commercially available DNA Extraction Kit from Prolab marketing Pvt. Ltd., according to the manufacturer's protocol and following the manufacturers' instructions. Nine SNPs in ADAM33 and one SNP each in MMP1, MMP9 and MMP 12 suspected to be associated with COPD, asthma, airway hyper-responsiveness, or excessive decline in FEV_1 are under study. Amongst which we have genotyped few SNPs from ADAM33 and rest we have standardised for PCR and other methodology.

III. Amplification of gene in PCR: PCR amplification was carried out in 50µL volume containing 50 ng of gDNA, 0.2 mM dNTPs (New England Biolab), 2 U Taq polymerase (New England Biolab), 10X PCR buffer (New England Biolab), 0.3 mM $MgCl_2$, 0.1 µmoL each of primers (Sigma, Aldrich). Thermal cycling was performed in a gradient PCR thermal cycler from BioRad Pvt. Ltd.

Primer design: Specific forward and reverse primer pairs were designed to span the following specific SNPs of ADAM 33, MMP 1, MMP 9 and MMP12 genes:

SNPs of ADAM 33 gene:

- **Reference SNP ID, SNP, Base or amino acid change**

1. rs2787094[53], V4, UTR C to G
2. rs2280090[53], T2 , Exonic C to T Pro(774)Ser
3. rs2280091[53], T1, Exonic T to C Met(764)Thr
4. rs2280089[53] , T+1 , A/G
5. rs612709[53], Q-1, Intronic C to T
6. rs511898[54] , F+1 , Intronic G to A
7. rs3918396[53] , S1 , Exonic G to A Val (710)Ile
8. rs528557[54] , S2 , Exonic C to G
9. rs597980[54] , ST+5 , Intronic G to A

SNPs of MMP 1 gene:

SNP ID	SNP
rs1799750	1G-1607 2G

SNPs of MMP 9 gene:

SNP ID	SNP
rs3918242	C-1562 T

SNPs of MMP 12 gene:

SNP ID	SNP
rs652438	A-82G

So far we have done the standardization part of all the methodology successfully including ELISA, DNA extraction, PCR, Electrophoresis & DNA sequencing & are collecting Samples. We have performed all the procedures including ELISA, DNA extraction from Fresh Blood of all the subjects belonging to different groups, PCR of the DNA extracted was then performed. MMP1 and MMP9 ELISA test were performed and the data will be analyzed and interpreted with the help of our Dept. of Statistics as soon as all the samples are processed and complete data is obtained.

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 analysed by the **Fully Automated BECKMAN COULTER SYNHRON CX-5 PRO** and **ALFA WASSERMANN AUTOANALYZERS**. A total number of 30538 tests are performed during the year 2010-11.

The following parameters were 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), S. *Alkaline Phosphatase* (ALP), Serum Electrolytes : S. Na^+, S. K^+, S. Cl^-, S. Ca^{++} and Pleural Fluid biochemical analysis including Pleural Fluid Total Protein, Pleural Fluid Albumin, Pleural Fluid Glucose.

Medical Mycology

Research

1. Systemic mycoses in HIV positive patients: a study of species spectrum of aetiologic agents, antifungal susceptibility pattern and epidemiologic aspects

A collaborative study was undertaken to determine the type and prevalence of systemic mycoses in HIV patients in Dr Ram Manohar Lohia Hospital. Two hundred and thirty-eight clinical specimens, comprising of 138 cerebrospinal fluid, 48 blood, 27 oral swabs, 11 sputa, 7 aspirates (3 lymph node, 1 bronchial and 3 bone marrow), 5 urine and 2 biopsies (1 skin and 1 lymph node) were collected. The specimens were homogenized, if required, and examined microscopically (KOH wet mount/fungal stains such as PAS and GMS) and cultured on Sabouraud glucose agar, CHROM agar, yeast phosphate agar, simplified Staib's niger seed medium, etc. The inoculated media were incubated at 28^0C and examined periodically. Species identification of the yeast isolates was done, based on morphological characters seen on appropriate culture media including corn meal agar and by ID 32 C carbohydrate assimilation profiles, detected by mini API system (bioMerieux, Marcy-I' Etoile, France). The mould isolates were identified by their detailed macroscopic and microscopic morphological characteristics on standard mycological media. Precipitating antibodies against pathogenic aspergilli such as *A. fumigatus*, *A. flavus, A. niger*, etc., were determined by Ouchterlony's double immunodiffusion test, using the in-house prepared antigens. Of 190 HIV positive patients investigated, 143 (75%) revealed mycotic infections. This included 118 cases of cryptococcosis and 27 of oropharyngeal candidiasis. Altogether, 163 fungal isolates were collected and identified. Of these, 116 were *Cryptococcus neoformans*, 2 *Cryptococcus laurentii*, 30 *Candida albicans*, 4 *Candida tropicalis*, 3 *Candida glabrata*, and 1 *Candida famata*. Of the 7 molds, 3 were *Cladosporium cladosporoides* and one isolate each of *Rhizopus microsporus*, *Fusarium incarnatum*, *Aspergillus fumigatus* and *A. niger*. Thus, *Cryptococcus neoformans* was found to be the commonest systemic pathogen in the HIV-positive patients investigated, occurring in 116 (61%) of the 190 HIV-positive patients. Meningitis was the commonest clinical manifestation in patients with cryptococcosis, occurring in 100 (77%) of the 130 cases. Dissemination of the disease to other organs was observed in 13 (10%) patients from whom *C. neoformans* was isolated in culture of blood, sputum or urine.

Antifungal susceptibility testing of 116 isolates of *Cryptococcus neoformans* showed low MIC ranges for amphotericin B (0.06-1 µg/mL). Among the azoles, voriconazole exhibited the highest activity with MIC range 0.015-0.125 µg/mL, followed by itraconazole, 0.03-1 µg/mL and fluconazole 0.5-8 µg/mL. Barring two isolates of *Cryptococcus neoformans* which had MIC-64 µg/mL, none was found resistant to 5-flucytosine. Echinocandins showed poor activity against *Cryptococcus* species (MIC >8µg/mL). MIC /MIC (0.25/0.5 µg/mL) data of 30 *Candida albicans* isolates revealed a high susceptibility to fluconazole. Other *Candida* species also exhibited low MIC's for itraconazole, voriconazole (0.03-0.125 µg/mL) and amphotericin B (0.06-0.125µg/mL). Among the filamentous fungi isolated, *Aspergillus fumigatus, A. flavus,* and *A. niger* showed the highest susceptibility to echinocandins. Of the three echinocandins, micafungin and anidulafungin were more potent than caspofungin. One isolate of *Rhizopus* tested was susceptible to amphotericin B (MIC 0.125µg/mL) but resistant to itraconazole (MIC 16µg/mL), voriconazole (MIC 16µg/mL) and echinocandins (MEC >8µg/mL). A solitary isolate of *Fusarium incarnatum* showed MIC of 2µg/mL to voriconazole and amphotericin B but resistance to itraconazole, MIC 16µg/mL and echinocandins, MEC >8µg/mL. Fluconazole (MIC 64µg/mL) and 5-flucytosine (MIC 64µg/mL) did not show any activity against any of the molds tested. Micafungin and anidulafungin were found to be very potent drugs against the molds tested barring *Rhizopus microsporus* and *Fusarium incarnatum.*

2. *In vitro* antifungal susceptibility profiles of human pathogenic molds isolated in hospitals of Delhi/ New Delhi

Fungal infections pose a major health problem worldwide in the management of immunocompromised patients. *In vitro* antifungal susceptibility testing of their aetiologic agents facilitates administration of specific therapy that is vital for prevention of unwarranted morbidity and mortality. We determined *in vitro* antifungal susceptibility profiles of 300 miscellaneous pathogenic molds, isolated from various hospitals of Delhi/ New Delhi, by the CLSI M38-A2 broth microdilution method against fluconazole, itraconazole, voriconazole, 5-flucytosine, amphotericin B, caspofungin, micafungin, and anidulafungin. The test molds included *Aspergillus*

fumigatus, n-106, *A. flavus* - 78, *A. niger* - 9, *A. terreus* - 20, *A. nidulans* - 4, other aspergilli - 5, *Rhizopus* spp. - 39, *Alternaria* spp. -12, *Scedosporium* spp. - 8, *Bipolaris* spp. - 6, *Fusarium* spp. - 5, *Cladosporium* spp. - 4, others - 4. Identification of the isolates was done by standard mycological procedures and confirmed by sequencing of ITS-5, ITS-4, and D1 & D2 region. Amphotericin B exhibited low MICs against Zygomycetes (MIC_{90}; 0.16µg/mL), *Aspergillus* spp. (MIC_{90}; 0.5-1µg/mL) and *Madurella mycetomatis* (0.125-0.5µg/mL) whereas *Fusarium*, *Scedosporium* and *Alternaria* spp. were resistant to amphotericin B. Among the azoles, itraconazole and voriconazole showed excellent activity against *Aspergillus spp.* (MIC_{90}; 0.25-0.5µg/mL), *Scedosporium apiospermum* (MIC_{90}; 0.5µg/mL) and species of *Alternaria, Bipolaris, Cladosporium* and *Curvularia* (MIC_{90}; 0.125-0.5µg/mL). In contrast, *Fusarium* spp. showed susceptible dose dependent MICs to voriconazole (MIC_{90}; 2µg/mL) and resistance to itraconazole (MIC_{90}; 16µg/mL). Fluconazole and 5-flucytosine were not active against the molds tested. Itraconazole and voriconazole exhibited excellent *in vitro* activity against all the molds. Among the echinocandins, micafungin and anidulafungin showed better activity than caspofungin against the test molds excepting species of *Rhizopus* and *Fusarium* which were resistant. To the best of our knowledge, no systematic study on antifungal susceptibility profiles of pathogenic molds isolated in Delhi/New Delhi hospitals has been conducted hithertofore.

3. Comparison of agar diffusion Etest assay with broth microdilution reference assay for 51 clinical Zygomycetes

Zygomycosis is a highly aggressive, usually fatal mold infection, occurring in patients with diabetes mellitus, haematological malignancy and in transplant recipients. The most commonly reported aetiological agents are species of *Rhizopus, Rhizomucor*, *Mucor* and *Lichtheimia* (*Absidia*). Species identification is epidemiologically and clinically important because of variable antifungal susceptibility of the aetiologic agents. Although the Clinical and Laboratory Standards Institute (CLSI) has developed reproducible procedures for antifungal susceptibility testing of molds by broth microdilution method, reference guidelines are not available for mold disk testing. The purpose of this study was to compare agar diffusion Etest method to reference broth microdilution method M38A2 for *in vitro* susceptibility testing of of 51 clinical isolates of *Zygomycetes*. The test isolates included 31 *Rhizopus oryzae*, 10 *R. microsporus*, 2 *R. stolonifer*, one *R. azygosporus*, 3 *Apophysomyces elegans*, 3 *Syncephalastrum racemosum* and 1 *Lichtheimia corymbifera*. The isolates originated from 45 patients admitted to our Institute or various tertiary care hospitals in Delhi/New Delhi during 2004-2011. Forty-two of the isolates (82%) were from patients with pulmonary zygomycosis, 5 (10%) from cutaneous and 4 (8%) from rhino-orbital-cerebral zygomycosis. They were identified by macroscopic and microscopic morphological features, following the standard procedures. In addition, identification of most of them was confirmed by direct DNA sequencing of internal transcribed spacer (ITS) and D1/D2 regions of rDNA. Their *in vitro* susceptibility to amphotericin B, fluconazole, itraconazole, voriconazole, caspofungin, micafungin, anidulafungin and 5 flucytosine was tested, using CLSI broth microdilution method (M38 A-2). All of the isolates were tested for their susceptibility to posaconazole and amphotericin B, using the Etest. Etest for posaconazole was done on RPMI 1640 agar with 2% glucose and for amphotericn B on Antibiotic Medium 3. Amphotericin B proved to be the most potent antifungal agent, with MICs d" 1 µg/mL, ranging from 0.03-1 µg/mL, geometric mean (GM) 0.053 µg/mL, MIC_{90} 0.15 µg/mL, MIC_{50} 0.03 µg/mL. Itraconazole exhibited limited activity in 38% of isolates (MIC range 0.06-0.5 µg/mL) whereas the remaining isolates showed higher MICs, ranging from 1-16 µg/mL. Fluconazole and voriconazole (GM 5.80, MIC_{90} 16 µg/mL, MIC_{50} 8 µg/mL) demonstrated none or poor activity. MICs of posaconazole determined by Etest ranged from 0.38 µg/mL-32 µg/mL. Forty-five percent of the isolates had MIC > 1µg/mL and two of *Rhizopus* species were resistant (MIC >32 µg/mL). The echinocandins tested showed no activity (minimal effective concentration >8 µg/mL). The overall agreement of MICs (% MIC within 3 dilution range) between reference amphotericin B and Etest MICs was 85%. Amphotericin B was the most potent antifungal whereas posaconazole showed good activity, followed by itraconazole against the Zygomycetes.

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 2377 clinical specimens were processed during the year. These included 1183 sputa, 828 blood specimens, 319 bronchial lavage/aspirate/washings, 19 tissue biopsies/nasal polyps/skin scrapings, and 28 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. Differential serum cytokine levels and cytokine gene polymorphism in patients suffering from pulmonary tuberculosis in north India

Recent advances in analysing the role of genetic variants in disease have seen an emerging multitude of genetic studies being taken up in multifactorial diseases like tuberculosis. The aim is to understand and analyse the potential role of these variants in genetic proneness or resistance to the disease.

Targeting cytokine genes association studies done with precision may uncover a specific group of people either protected or prone by the virtue of change at a particular locus or a combination of heritable loci, the "haplotypes" and bring to light some previously unrelated associations. Coupled with expression analysis these studies may help in designing immunotherapy for individual patients. Identifying a group with a certain genetic profile who could be prone to tuberculosis with no sign or symptom of infection may facilitate preventive immunization/gene therapy, thereby protecting the community at large.

Through our carefully planned studies among north Indian population, healthy as well as pulmonary tuberculosis (PTB) patients we were able to identify a series of previously unrelated novel polymorphisms in a panel of cytokine genes which *i)* are associated with differential serum cytokine levels which include the following loci of *TNF A*gene at rs3093662, the *IL12* gene at rs3213094 and rs3212220 and the *IL10* gene at rs3024498. Many variants included in the study are novel loci which have been included in a tuberculosis polymorphism study for the first time and includes variants of the *TNFA*gene at rs3094662, the *IL10* gene at rs3024498, rs3024490, the *IL12* gene at rs3213094, rs2853694, rs3181216, rs730690 and the *IL4* at rs2243266 and *ii)* establish their associated status in a case-control analysis in pulmonary tuberculosis. We found significant overall risk against PTB at seven loci which includes variants in *IFNG* at rs1861493 and rs1861494; *IL1RA* at rs4252019, *IL4* variant rs2070874, *IL12* variants rs3212220, rs2853694 and *TNFA* variant rs1041981. Analysis of gene structure revealed two haplotype blocks formed by *IFNG?* variants rs1861493 and rs1861494. The TA haplotype was significantly overrepresented (P = 0.011) in the cases showing a two-fold risk in the current population (Odds ratio =1.59 CI =1.101 to 2.297) and *TNFA?* variants at rs2229094 and rs1041981 contributed to two haplotypes which were in strong LD with AT haplotype showing a three-fold risk (P = 0.0011, Odds ratio = 3, CI = 0.1939 to 0.7445) of developing PTB in north Indians.

2. Functional analysis *of mce1A* and *mce4A* genes of *M. tuberculosis* using overexpression approach

Microorganisms have evolved a variety of strategies for survival and proliferation in mammalian host cells. Pathogenic mycobacteria, including *Mycobacterium tuberculosis*, are phagocytosed by macrophages and manage to survive within the mycobacterial phagosome. It is pertinent to note that a mycobacterial gene cluster, *mce4* operon is specifically required for bacterial survival during this prolonged infection. In our previous communication, we have for the first time reported that *mce4A* (Rv3499c) gene of *mce*4 operon is playing a pivotal role in maintenance of persistent tubercular infection. A report is also available on the role of *mce4* operon in utilisation of cholesterol, but it is still not clear which gene is responsible for cholesterol uptake. In this report, we have focused on analysis of the role of *mce4A* protein in cholesterol binding and cholesterol import system in *M. tuberculosis* that enables the pathogen to derive both carbon and energy from the host cells. For this purpose, we cloned *mce1A* gene and *mce4A* gene of *mce1A* and *mce4* operon, respectively, in shuttle vector (pVV16) and electroporated in *M. tuberculosis* H37Rv. Through *in vitro* CFU studies, we observed that the growth of *mce4A* over-expressed cells was more than the wild type, *Lpr'N'* or *mce1A* over-expressed or *mce4A* antisense. Cholesterol binding assay also clearly indicated that *mce4A* overexpressed cells have more binding activity than the wild type, *Lpr'N'* or *mce1A* over-expressed or *mce4A* antisense. In *ex vivo* experiments, it was also observed that over-expressed *mce4A* infected THP1 cells take more amount of cholesterol as compared to the wild type and control cells. Our observation clearly indicates a role for *mce4A* gene in cholesterol utilisation by *M tuberculosis* which in turn may have a very significant role to play in survival within the host macrophages.

3. Role of *lspA* gene in the biology and pathogenesis of *Mycobacterium tuberculosis*

In *Mycobacterium tuberculosis* (*M. tb*) there are 104 (approx.) lipoproteins, which make up an abundant class of membrane-anchored cell wall proteins with a broad range of functions. *Lipoprotein Signal Peptidase* (*LspA*) Rv1539 is the only known protein, responsible for the maturation of all lipoproteins in mycobacteria. This peptidase was previously identified as an important protein for virulence but non essential for *M.tb* survival through *lspA* mutant (*lspA*:*lspA*mut). In the present study, we overexpressed *lspA* (*lspA:lspA* **'!**) and checked for its potential role in mycobacterial pathogenesis. We found that overexpression of *lspA* gene of *M. tuberculosis* made it hypervirulent and showed enhanced inflammatory changes and granuloma formation by gross tissue examination and hitopathology of the lung and in the BalbC mice model. Interestingly there is no homologue of this gene in human host. This gene, therefore, has a potential to be used as a drug target in future.

4. Regulation of expression of *mce4* operon of *Mycobacterium 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. Each *mce* locus includes two *yrbE* and six *mce* genes. Besides functional characterisation, study of regulation of genes also plays an important role in better understanding of pathogenesis of any organism. Regulatory elements for *mce1, mce2* and *mce3* operons have been characterised. Present study was designed to identify the promoter region as well as the regulatory proteins of *mce4* operon. *In silico* analysis performed using BPROM and Neural Network Promoter Prediction softwares revealed the possibility of promoter region in 300 bp upstream region of *mce4* operon. This region has been cloned in pSD5B promoter selection vector, electroporated in *Mycobacterium smegmatis* and ONPG assay was performed to establish promoter activity. To determine transcription start site of *mce4* operon 5'RACE (rapid amplification of 5'cDNA end) was performed which revealed that transcription start site (TSS) of *mce4* operon is 52 bp downstream from putative translational start site predicted bioinformatically (www.tuberculist). As new TSS was found, 600bp DNA region with new TSS was again cloned in pSD5B and electroporated in *Mycobacterium smegmatis*. The expression of lacZ leading to blue colonies indicated the presence of promoter activity in this fragment. Further, promoter activity would be analysed using ONPG assay under different stress conditions like acidic stress, surface stress, NO and hypoxia conditions given to *M. smegmatis* and then to *M. tuberculosis*. The regulatory proteins would be identified using bioinformatics, EMSA and 2D-gel electrophoresis.

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

Conventional serotyping using pneumococcal antisera. This was carried out using the latex agglutination assay. Latex beads coated with pools of pneumococcal antisera were used for the test. Seventy-nine samples have been tested so far. It identified the serotypes 1(6), 19(12), 9 (2), 11(2), 14 (4), 3(1), 6(1), 33(3), 23(1), 7(2), 17(3), 4(1), Non-vaccine types (11) and untypable (32).

Serotyping using multiplex PCR: Serotyping of *S.pneumoniae* using the conventional antisera is very expensive and subjective. Hence a multiplex PCR was developed to serotype the strains. It involved a set of 5 reactions. Each reaction consisted of 4 serotypes and an internal control. Reactions consisting of primers for serotypes 19A, 19F, 1, 6, 7F, 23F, 5 , 14, 12F, 9V, 18, 15B/C were used in 116 isolates of *S. pneumoniae*. One hundred and sixteen samples were tested. The 3 sets of reactions identified serotypes in 45/116 (34%) isolates. They were 19A (10), 19F(9), 1(12), 6(2), 7F(4) & 14(3), 12F(2), 9V (2), 18(1).

*Direct detection of Streptococcus pneumoniae in clinical samples using two-step PCR:*_Direct detection of *S.pneumoniae* was carried out in 205 clinical samples like CSF, bronchial alveolar lavage fluid, and pleural aspirate. It consisted of a two-step PCR, the first step detected the 16S RNA of the bacterium and the 2nd step detected *S. pneumoniae* specifically. Out of 205 samples tested 84 were positive for *S. pneumoniae* by PCR.

Pulsed field gel electrophoresis (PFGE) was carried out on 50 samples. A high degree of variability was observed among the isolates showing 47 distinct PFGE types with >20% difference in UPGMA generated dice coefficients.

6. Detection of Metallo β-lactamases (MBLs) in clinical isolates of *Pseudomonas aeruginosa*

In continuation of the last years work. PFGE was performed on 30 samples. A high degree of variability was observed among the isolates.

7. 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.

8. Expression analysis and protein profiling of drug efflux transporters in clinical isolates of *Mycobacterium tuberculosis*

Efflux pumps that confer resistance to one or several compounds have been described in mycobacteria. The genome of *Mycobacterium tuberculosis* strain H37Rv carries 20 such putative efflux proteins, although most of them have not yet been characterised. It is important to characterise and to study the expression profile of such pumps under pressure of different drugs and also to study the mode of action, source of energy used and substrate profile, not only to understand the mechanics of drug resistance but also to design new therapeutic strategies to control the spread of tuberculosis, particularly drug resistant tuberculosis.

Recent research into efflux mechanisms in mycobacteria, using standard laboratory strains, has provided promising insights, but the relevance of efflux mechanism to the resistance of clinical isolates of *M. tuberculosis* is only just beginning to become clear.

We propose to investigate the expression analysis of efflux related genes under drug pressure to investigate the role of efflux pumps in drug resistance, particularly in multidrug resistant isolates of *M. tuberculosis* obtained from patients of pulmonary tuberculosis. We have searched for 10 efflux related genes in *M. tuberculosis in silico e.g.*, Rv2459, Rv3239C, Rv1557, Rv0676C and Rv2339. We have determined the minimal inhibitory concentration (MIC) of five drug sensitive and five multidrug resistant clinical isolates of *M. tuberculosis* by Alamar blue assay. The MIC of the standard laboratory strain H37Rv has been found out to be 0.4µg/mL for Streptomycin, 0.04 µg/mL for Isoniazid, 1 µg/mL for Ethambutol and 0.015 µg/mL for Rifampicin. To study the mRNA expression profile of the efflux genes identified bioinformaticallythe clinical isolates and H37Rv were grown under different subinhibitory concentrations of isoniazid and rifampicin. cDNA has been prepared from H37Rv and a real time assay has been set up. Results of the assay are awaited.

In addition, 2D gel electrophoresis is being standardised to study the protein profile of H37Rv and clinical isolates in order to determine the efflux proteins overexpressed in the presence of subinhibitory concentrations of antituberculous agents.

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

Though reliable statistics are unavailable, a large number of patients of tuberculosis in India go to private clinics because of easy access and time constraints. This could influence the outcome of tuberculosis control. Yet, no studies in India have reported the drug susceptibility profiles of patients undergoing private treatment. One study analysed the incidence of fluoroquinolone (FQ) resistant *Mycobacterium tuberculosis* in a private hospital from 1995 to 2004 and concluded that FQ resistance had increased exponentially from 3% in 1996 to 35% in 2004. However, there are no comprehensive reports on the drug resistance profile of *M. tuberculosis* to first line antituberculous agents from other private hospitals in India. Moreover, very few studies have reported the drug resistance profile of *M. tuberculosis* isolates from patients being treated in DOTS centers. Hence, the present study was undertaken to ascertain the incidence of drug resistance of *Mycobacterium tuberculosis* isolates from patients in North Delhi, being treated through DOTS, through a non-DOTS referral center and in private clinics; and to study the molecular epidemiology of the strains of *M. tuberculosis* circulating in our community.

A total of 260 sputum samples have been collected from the DOTS center. Of these 151 were AFB smear positive. Of the 200 samples obtained from non-DOTS center, 87 were AFB smear positive. Of the 42 samples collected from private centers, 34 were smear positive. Till date, 47, 20 and 30 samples from RBTB Hospital, private centers and VPCI, respectively, have been found to be culture positive. The other samples are still under observation

Amongst the culture positive samples, drug susceptibility assays have been carried out for the 67 cultures obtained from RBTB and the private centers. Resistance to INH (36%), RIF (23%) and SM (57.4%) was observed more in the *M. tuberculosis* isolates obtained from the DOTS center than among those obtained from the

private centers (20% each). Resistance to EMB was seen more in the *M. tuberculosis* isolates obtained from the private centers (35%) than those obtained from the DOTS center (25.5%). Although not statistically significant, a higher proportion of MDR *M. tuberculosis* was found in isolates from the DOTS center (12.7%) as compared to the private centers (5%) ($p>0.5$). None of the isolates were monoresistant to RIF.

Eight (22.8%) out of 35 cases followed up from the DOTS center and 2/12 (16.6%) cases from private clinics were smear and culture positive. The number of patients accessible to follow up were significantly higher in the DOTS center ($p<0.01$). The frequencies of resistant strains among the 8 isolates followed-up from DOTS center, were 5 (62.5 %), 3 (37.5%), 2 (25%) and 1 (12.5%) for SM, INH, RIF and EMB, respectively. Among the two *M. tuberculosis* isolates obtained on follow up of patients from private centers, there was no difference in the drug susceptibility profile between the initial and follow up isolates. One isolate was simultaneously resistant to INH, SM and EMB while the second strain was sensitive to all four first line antituberculous drugs.

10. Real time PCR for early identification of *M. tuberculosis*

We have also used a Sybr Green assay to identify *M. tuberculosis* using primers to amplify the IS*6110* segment which is present only in *M. tuberculosis* complex. We have identified 56 clinical isolates of *M. tuberculosis* using the Sybr Green assay. We have also used a Taqman assay with an IS6110 Fluorophore-quencher probe and the primers used in the sybr green assay. The assay has been carried out on 80 clinical isolates in a Lightcycler 480II. Of these, 12 were identified to be non tuberculous mycobacteria. We used H37Rv and *M. microti* as the positive controls and *M. smegmatis*, *M. terrae, M. avium, M. fortuitum, M. phlei, M. kansasii* and *M. gordonae* as negative controls in a Lightcycler 480II.

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	2746
Urine	156
Bronchial Aspirate	192
Pleural Fluid	93
Blood	39
Endotracheal Aspirate	103
Pus (FNAC)	06
Total	**3335**

Organisms Isolated	***No.***
Pseudomonas	163
E. coli	48
Klebsiella	56
Enterobacter spp.	11
Acinetobacter spp.	79
GNB	15
Moraxella catarrhalis	03
Haemophilus influenzae	07
Streptococcus pneumoniae	10
Staph aureus	16
Total	**408**

ii. Mycobacteriology Laboratory

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

Nature of Specimen	*No.*
Sputum	6385
Post Bronchoscopy Sputum	255
Bronchial Aspirate	213
Broncho Alveolar Lavage (BAL)	84
FNAC	02
Pleural Fluid	117
EndoTracheal Aspirate	57
Ascitic fluid	01
Pus	03
CSF	01
Tissue Biopsy	01
Knee Aspirate	01
Total	**7120**

b) **Clinical specimens processed with BACTEC 460 TB system**

BACTEC 460 TB System	124
Drug susceptibility	25

"Workshop on Transbronchial Lung Biopsy Interpretation" held on 29th November 2010.

Pathology

Research

1. Correlation of sputum cytological atypia detected by morphometric analysis with histopathological and clinical features

Detection of lung cancer by conventional sputum cytology has low sensitivity as it is based on subjective classification into, mild, moderate, severe atypia with lack of clear criteria between the grades. This simple noninvasive test can be improved by morphometric analysis and grading of atypia and could prove to be a powerful tool for early lung cancer detection. The sputum samples submitted to Pathology department of the Institute from 2005 onwards were reviewed. On the basis of cytology these cases had been classified into *(i)* Normal, *(ii)* Inadequate/unreadable, *(iii)* Inflammatory expectorate, *(iv)* Inflammatory expectorate with atypia, *(v)* Carcinoma. In the cases showing sputum atypia (groups *iv* and *v*), the clinical characteristics of the patients and the fine needle aspiration biopsy (FNAB) and transbronchial lung biopsy (TBLB) records were retrospectively analysed and correlated with sputum morphometry. The 145 cases showing sputum atypia included 128 males and 17 female patients in age group 35 to 90 years. Morphometry of atypical cells in sputum revealed an increase in nuclear size in moderate atypia when compared to control. Further increase in atypia was associated with nuclear pyknosis, hyperchromasia and bizarre shape of cells with increase in nuclear cytoplasmic ratio. FNAB and TBLB records were obtained in 38.62% (56/145) cases. On correlation with histopathology, diagnosis of carcinoma was made in 55.36% (31/56), granulomatous inflammation in 14.29% (8/56), acute pneumonitis in 5.36% (3/56), fibrotic scar lined by metaplastic cells in 3.58% (2/56), carcinoma *in situ* in 1.79% (1/56), chronic interstitial pneumonitis in 1.79% (1/56), while 10 cases remained inconclusive (17.86%). 88.65% cases diagnosed as carcinoma (25/31) were males above 50 yrs of age. These results indicate that sputum cytology when accurately graded using nuclear morphometry and correlated with FNAB and TBLB, can detect lung carcinomas and may prove to be the much needed cost effective marker for lung cancer in male population above 50 years of age.

2. Parenchymal and vascular remodelling in bleomycin model of pulmonary fibrosis and pulmonary hypertension

Pulmonary fibrosis is a chronic progressive lung disease characterised by fibroblast proliferation and extracellular matrix remodelling. It is frequently complicated by pulmonary arterial hypertension with a relatively high prevalence (30% to 40%). The exact pathophysiological mechanisms of lung fibrosis are not known. Lung fibrosis was previously thought to be secondary to alveolar inflammation, leading to recruitment of fibroblast/myofibroblasts and subsequent fibrosis. However, it is presently considered to be a primary epithelial/fibroblastic disease, Inflammation is secondary event. In the lungs parenchymal and vascular remodelling may share pathomechanisms and need to be addressed. Male Wistar rats were administered intratracheal bleomycin and sacrificed after 7, 14 and 28 days. Excised lung sections were stained by haematoxylin-eosin stain and the severity of fibrosis was semi-quantitatively assessed. Image analysis and morphometry was performed using Nikon fully motorised trinocular research microscope and the degree of thickening of bronchioles, interstitium, and pulmonary arterioles was assessed. On day 7, peribronchiolar neutrophilic infiltrate was seen. On day 14, this progressed to chronic peribronchiolar inflammation with minimal fibrosis and on day 28, interstitial fibrosis with bronchiolitis obliterans was observed. Quantitative reverse transcriptase *in situ* polymerase chain reaction (PCR) was then performed and standardised on paraffin sections and frozen sections and RNA was extracted for real time PCR analysis.

3. Role of a pattern based approach in transbronchoscopic lung biopsy interpretation and its clinical implications

Transbronchoscopic lung biopsies (TBLB) are commonly being done for the tissue diagnosis of diffuse parenchymal lung diseases, worldwide and there is an urgent need to establish guidelines for TBLB interpretation inorder to improve its utility. A retrospective analysis of 916 consecutive patients who underwent TBLB over a five year period from July 2005 to July 2010 at our Institute was done. There were 494 males and 422 females with a mean age of 49 years. In 615/916 (67.14%) procedures the TBLB was adequate for histopathology interpretation. Pathologic features evaluated in each case were; alveolar architecture,

inflammatory infiltrate, interstitial fibrosis, atypical cells, pigment deposition, honeycomb change and fibroblast foci. The cases were categorized on the basis of histopathology into 6 patterns; *i)* Acute pneumonitis, 29 cases (4.72%), *ii)* chronic interstitial pneumonitis with or without fibrosis, 138 cases (22.44%); *iii)* granulomatous inflammation, 186 cases (30.24%); *iv)* carcinoma lung, 109 cases (17.72%), *v)* Others, 16 cases (2.60%), *vi)* adequate biopsy without a specific diagnostic abnormality, 137 cases (22.28%). Definitive diagnosis could be made after correlation of TBLB histopathology with clinical and radiological features in 55.28% cases. Our data reinforces the view that TBLB are an important diagnostic tool when systematically evaluated in cases of diffuse lung disease. The use of a pattern based approach to TBLB adds to its diagnostic yield and is clinically relevant in cases where surgical lung biopsy is not available. The need for meticulous clinical and radiological correlation is also emphasised in coming to a definitive diagnosis in these cases.

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 48,264 tests were done during the period as per details given below.

Haematology tests	**Number**
Haemoglobin estimation	13248
Total leukocyte count	13248
Differential leucocyte count	13248
ESR	2219
Absolute eosinophil count	819
Platelet count	5214
Peripheral smear	90
P/S for malarial parasite	177
Reticulocyte count	01

Coagulation Laboratory

A total of 776 tests were done during the period as per details given below.

Coagulation Test	**Number**
Prothrombin time	65
Activated partial thromboplastin time	66
D-Dimer	88
Fibrinogen degradation product	78
Bleeding time	570
Clotting time	570

B. Histopathology

A total of 192 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	189
Lymph node biopsy	00
Pleural biopsy	03
Skin biopsy	00

C. Cytopathology

A total of 750 samples were done during the period as per details given below.

Cytology Samples Processed	Number
Sputum	308
BAL fluid	74
FNAB : Percutaneous	88
Transbronchial (TBNA)	32
Bronchial aspirate	131
Pleural fluid	104
Tracheal aspirate	13

D. Clinical Pathology

Total of 3634 tests were done during the period as per details given below.

Urine Analysis	Number
Specific gravity	724
pH	724
Albumin	724
Sugar	724
Microscopic examination	724
Ketone bodies	14

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

Museum

The Department museum had 204 specimens. During the year, 40 lung specimens (obtained from K.E.M. Hospital, Mumbai) were added to this museum.

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. 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-nine patients were initially enrolled out of which there were nine drop outs – thus, 40 patients have since completed the study. Analysis of the results of 40 subjects indicate that the test drug, UNIM-352, is more effective and better tolerated that the matched placebo. 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. In view of these results, it has been proposed to conduct the study in a larger sample size including some other important biochemical markers of inflammation and immunity to confirm the potential role for this polyherbal as an adjunct in 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. Patients completed the study. 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. The data has been recently published in the *Indian Journal of Experimental Biology* in 2010. A detailed evaluation of its mechanism of action at the cellular and molecular level is now planned, in continuation with this project, and a DST sponsored project involving the pharmaceutical industry and the VPCI is in the process of being submitted.

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 medicine for bronchial asthma. The scientific basis for its use, however, is still not clearly defined and validation of the same was warranted. As inflammation and immunity are two related pathophysiological processes which contribute to bronchial asthma, the present study evaluated the possible anti-inflammatory and immunomodulatory effects of UNIM-352 in experimental models relevant to asthma. Studies were conducted in albino rats, and both pharmacological and biochemical parameters were assessed. The effects of UNIM-352 at two dose levels, viz. 200 and 400 mg/kg orally, were tested on markers of inflammation and immunity, pertinent to bronchial asthma, in KLH immunized, normal as well as stressed rats. Restraint stress (RS) was used as the model for emotional stress. The polyherbal agent, dose dependently attenuated levels of the pro-inflammatory cytokines, TNF-alfa and IL-1 beta, in both normal as well as stressed rats. The levels of reduction in these two cytokines were apparent in both blood and BAL fluid. On comparison with the standard anti-inflammatory agent, prednisolone, the effects of UNIM-352 were most comparable, with the results with the higher dose (400 mg/kg) being most notable. Levels of the Th2 dependent cytokine, IL-4 were also affected markedly by the polyherbal formulation. The effects with the higher

dose being most marked and also most comparable with the positive control group, *i.e.* prednisolone. Most of these results achieved levels of statistical significance ($p<0.05$). Assay of the antioxidant profile showede that, UNIM-352, dose dependently, elevated the GSH levels in both blood and BAL fluids. On the other hand, levels of MDA, an index of lipid peroxidation and free radical generation, were lowered in both normal and stressed rats in the blood. Nitric oxide metabolites (NOx), which were also influenced during exposure to the antigen as well as stress, were also modulated by the UNIM=352 treatment, but most of these data were either inconsistent or not statistically significant. Interestingly, the DTH response, as measured by the change in footpad thickness in immunized and subsequently KLH (paw) challenged rats, there was not any marked changes after UNIM-352 treatment. Thus, analysis of the cytokines showed that expression of TNF-alpha, IL-1 beta and IL-4 - all showed that UNIM-352 was equally effective in lowering this proinflammatory and immunomodulatory cytokine levels in both blood and BAL fluid samples. There was a significant decreasing effect in MDA levels in prednisolone and UNIM-352 treated groups as compared to the controls, whereas, lowered GSH levels were reverted back to normalcy under the influence of UNIM-352. Regarding the change in the levels of nitric oxide metabolites in both blood and BAL, UNIM-352, showed inconsistent changes in the NOx levels in normal and stressed groups. Though no clearcut picture emerged from the CMI experiment, a marginally higher DTH was observed in the prednisolone and UNIM-352 treated groups, as compared to vehicle controls. The present results provide new dimensions for the use of UNIM-352 allergic and inflammatory conditions, and validate the use of this polyherbal in bronchial asthma. In experiments involving bronchial hyperreactivity, our studies showed that YNIM-352 dose dependently inhibited the cumulative dose response curve of histamine on the isolated guinea pig tracheal chain preparation. Such translational studies using the reverse pharmacology approach will go a long way to bridge the gap between traditional and modern medical concepts in the treatment of disease states.

4. Role of endogenous opioids and its interactions with NO during stress responses in rats

In the present study, we evaluated the role of endogenous opioids and their interactions with nitric oxide (NO) during stress responses in rats. Endogenous opioids are important neuromodulators during stress reactions and μ, k and δ receptors have been implicated. Recent studies showed that NO may act as a neuromodulator during stress and the present experiments were designed to evaluate the possible association between opioids and NO in stress susceptibility and tolerance in rats. Studies were carried out using neurobehavioral, endocrinal and biochemical parameters during restraint stress (RS) and their modulations by opioidergic and NO ergic agents. RS *(a)* suppressed behavioural activity in the elevated plus maze and open field, *(b)* elevated plasma corticosterone, and *(c)* suppressed adaptive immune responses. Morphine attenuated these stress responses in a dose related manner. Other selective opioid agonists and antagonists for k and delta receptors also showed differential nature of effects on stress parameters studied. The mu opioid antagonist, naltrexone, showed opposite effects, and the k-antagonist, norbinaltorphimine, showed mixed responses. No such clearcut responses were seen with the delta antagonist, naltrindole. Neurobehavioural data after acute and repeated RS exposure showed a good correlation with brain biochemical data (NOx) with reference to morphine. Pretreatment with the NO synthase inhibitor, L-NAME, attenuated morphine effects during RS. Further, sub-threshold doses of morphine and NO mimetics synergised with each other in protecting against stress effects. Morphine induced attenuation of neurobehavioural effects were accompanied by elevations in brain NOx. Though morphine and SNC-80 (the delta agonist) affected neurobehavioural responses to a greater extent, the immunological responses during stress were more dependent on kappa opioid receptor mediated mechanisms. These results suggest differential nature of opioid receptor involvement during stress responses. Further, opioid-NO interactions may be playing an important role in such neuromodulatory effects.

5. Studies to explore gender differences in stress responses with special emphasis on NO

Nitric oxide (NO) is widely recognised as a physiological regulator of several body functions and its involvement in both cardiovascular and extra cardiovascular pathophysiological states is becoming increasingly apparent. Both experimental and clinical studies have shown that NO may act as an important marker molecule and NO modulators can be effective therapeutic strategies. Earlier studies from our laboratory had shown that age and emotional status could predict stress susceptibility and NO as also its interactions with other biological markers could influence such changes. It is also well known that gender differences influence physiological and pharmacological responses. The present study was planned to explore the

pharmacological basis for gender differences in stress responses in rats. Restraint stress (RS) induced biological changes *viz.* behaviour, neuroendocrinal, immunological and gastric, were assessed in both male and female rats, and their possible correlation with NO ergic mechanisms were assessed. Interactions of NO with oxidative stress markers were also evaluated. In addition, the effects of oestrogen antagonists on stress responses in female rats were assessed. Acute restraint stress (RSx1) induced anxiogenic responses in the elevated plus maze (EPM) test, and suppression of both open arm entries and time spent were greater in males as compared to females. These were accompanied by reductions in brain and plasma NO metabolites (NOx) and increases in ADMA (an endogenous NOS inhibitor) and malondialdehyde (MDA) levels. Pretreatments with L-arginine attenuated both neurobehavioural and biochemical changes after RS. Exposure of female rats to RS resulted in elevated levels of 17-β oestradiol and MDA and lowered NOx levels as compared to controls, and these effects were antagonised by formestane (but not tamoxifen) pretreatment. In the chronic restraint stress (RSx15) model, stress induced adaptation was apparent in female (and not in male) rats, as neurobehavioural effects in the EPM were attenuated towards control levels and brain NOx was also augmented. The chronic RS induced effects were, however, antagonised by tamoxifen pretreatment. These results suggest that female rats were more resistant to stressful experiences as evidenced by the nature of their acute and chronic RS responsiveness in a complex oestrogen dependent manner and that oestrogen–NO interactions were involved in such differential stress susceptibility and adaptation. These innovative findings strongly suggest that sex differences exist in stress susceptibility. Males and female rats react differently to emotional stressors like restraint stress, and NO may be having a regulatory influence in such sex-dependent nature of stress reactions.

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

Nitric oxide (NO) may play an important role in several disorders of the respiratory tract. Stress is a common predisposing factor for such conditions and the present study was designed to evaluate the possible regulatory role for NO in stress induced modulation of inflammatory and immune markers which have relevance to respiratory diseases like bronchial asthma. Initial experiments studies stress-NO interactions in mast cell degranulation. Mesenteric mast cells of ovalbumin immunised rats were collected after antigen challenge and the effects restraint stress (RS) were assessed. Both acute and chronic RS effects were tesed and the most prominenet effects were seen after chronic RS exposure wherein mast cell damage and degranulation were the maximum. Whereas, pretreatment with the NO synthase inhibitor, L-NAME did not appreciable attenuate these changes, a tendency towards potentiation was seen when the drug was given prior to RS exposure. Further studies are in progress with other NO-ergic agents to substantiate this hypothesis.

7. 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 like *Cassia spectabilis (flower), Chelidonium majus, Sorghum vulgare (seeds), Gloriosa superba (leaves)*. Chemically a ã-pyrone, 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. One report indicates that chelidonic acid at a dose of 10 mg/kg is as effective in inhibiting histamine release as the same dose of disodium cromoglycate, a mast cell stabilizer used in the prophylaxis of asthma and related allergic disorders. However, in view of the potential of this molecule of essentially herbal origin, and the impact that it may have against allergic and immunological diseases of the respiratory tract, it was planned to confirm the isolated report and also to conduct further elaborate studies on the anti-inflammatory and immunomodulatory effects of the molecule. The hypothesis is that chelidonic acid could have the potential to develop into an important lead compound for further drug development and a pharmacological target could be identified in the process. This lead-target interaction could help in the designing therapeutic agents in bronchial asthma and related inflammatory/immunological disorders. Preliminary studies have indicated that chelidonic acid dose dependently inhibited histamine release from peritoneal mast cells in prior immunized and antigen challenged rats, confirming the earlier reports, and further detailed studies are in progress to evaluate the mechanism of action of the compound.

8. Pharmacological studies on high altitude stress induced neurobehavioural and cognitive changes in rats

Exposure to high altitude results in deficient oxygen supply to the cells, tissues and the organs, there is a whole derangement in the normal functions of the body. In such situations, even though the oxygen

concentration is similar to that at sea level, due to a reduction in barometric pressure, the oxygen that is available for body functions is reduced. There has been an increasing interest in improving the psychological performance and cognitive functions at high altitude. Hypoxia is associated with alterations in neurobehavioral changes *e.g.,* anxiety and depression. For the present study, it has been postulated that the decline in neurobehavioral and cognitive functions at high altitude may be due to alterations in central NO levels. It is quite possible that some of the neurobehavioral and cognitive functions at high altitude may be improved by modulating the central NO levels. These aspects remain to be investigated and are the objectives of the present study. Initial results are encouraging and studies with NO modulators are in progress on such hypoxia induced neurobehavioral parameters.

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 Karnataka will fill 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 of the study

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 concordance between the prescription and the acquired antibiotics
   ii. Comparing antibiotics prescribed and acquired to local treatment guidelines.
c. Describe the demographics of people purchasing antibiotics.
d. Illustrate the degree to which different methods of collecting antibiotic use data reach similar conclusions.

The work is in collaboration with Dr H. Sudershan, Karuna Trust, Bangalore, Karnataka.

The study is being operated in the district hospital, taluka hospitals, PHCs managed by the government and NGOs, and private retail pharmacies in Tumkur district, Karnataka.

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

Technical Supervisor for both the projects conducted under Better Medicines for Children project of WHO.

To 'make medicines child size' is a global campaign spearheaded by the World Health Organization (WHO) launched in December 2007, to raise awareness and accelerate action to address the need for improved availability and access to safe, child-specific medicines for all children. The WHO initiated this project to improve availability of children's medicines in India with a special focus on Chhattisgarh and Orissa.

Objectives of the study

i. To document the availability of key essential medicines for children in public and private health facilities in the state of Orissa and Chhattisgarh.

ii. To document the price of these medicines in various public and private medicine outlets.

iii. To analyse the components of medicine prices for a few of the essential children's medicinesin these two states.

Methodology used for these two surveys was standardised methodology of WHO/HAI for measuring medicine prices, availability, affordability and price components.

Conducted the pre-survey training, mid-survey workshop, data cleaning and helping the teams for data analysis.

11. Lipid reducing herbal compound provide protection against diabetes induced cardiovascular disorders

Cardiovascular functions were studied in control and streptozotocin (STZ) induced diabetes rats. There was significant inhibition of the baroreflex sensitivity in diabetic rats suggesting impairment of neural regulation of blood pressure in diabetes. A significant rise in left ventricular end diastolic pressure was found in diabetic rats suggests cardiac disorder due to diabetes. The animals treated with herbal compound Arjuna Bark extract did not show any significant effect on various cardiovascular parameters compared to control.

12. Free radical mediated cardiovascular dysfunction in chronic heart failure: molecular and systemic mechanisms

Chronic heart failure (CHF) is a multifaceted syndrome with diverse presentations. The initial manifestations of hemodynamic dysfunction are a reduction in stroke volume and a rise in ventricular filling pressures, perhaps in the basal state but consistently under conditions of increased systemic demand for blood flow. Over the past several years a significant body of both clinical and experimental data has emerged suggesting a role for increased reactive oxygen species (ROS) in the pathophysiology of a CHF. Statins have also been shown to reduce the incidence of CHF and reduce mortality in patients with pre existing CHF. Statins exerts additional beneficial pleiotropic effects independent of its lipid-lowering action, such as free radicals scavenging activity, anti-inflammatory, antithrombotic, antioxidant actions and improve endothelial function. Certain indigenous drug preparations with naturally occurring herbs have been in use for many decades for the treatment of certain cardiovascular diseases and have antioxidant, antiplatelet, fibrinolytic, antiatherosclerotic, antihyperlipidemic, antiarrhythmic and vasodilatory actions. One such medicinal plant is *Terminalia arjuna*.

Objectives of the study

a. To study the hemodynamic, biochemical and histopathological alterations in isoproterenol induced chronic heart failure (CHF) rats.

b. To evaluate the therapeutic efficacy and prophylactic activity of *Terminalia arjuna* (*T. arjuna*) in animal model of isoproterenol induced CHF in rats.

c. To investigate the cardioprotective effects of fluvastatin as therapeutic and prophylactic agent in animal model of isoproterenol induced CHF.

d. To study the effects of fluvastatin and *T. arjuna* on neural regulation of cardiovascular function (baroreflex sensitivity) in isoproterenol induced CHF in rats.

e. To study the effect of fluvastatin and *T. arjuna* on lipid profile in CHF rats.

f. To examine the role of oxidative stress related mechanisms involved in the genesis of CHF and to investigate the protection provided by fluvastatin and *T. arjuna* as antioxidants.

g. To investigate the role of inflammatory mediator TNF-α in chronic heart failure and effect of fluvastatin and *T. arjuna* on the inflammatory marker.

Results of the study validated that chronic heart failure is associated with impairment of hemodynamic functions, neural control mechanisms along with increased free radical generation and inflammatory stress. Therapeutic and prophylactic treatment with *Terminalia arjuna* bark extract significantly improvement the cardiovascular functions as observed with statin, fluvastatin. Scavenging of free radicals by antioxidant nature, anti-inflammatory action with inhibition of pro-inflammatory cytokines and hypocholesterolemic property of *Terminalia arjuna* might have attributed to its overall cardioprotective action.

13. Role of free radicals in theophylline-induced seizures in experimental animals

The convulsiogenic and proconvulsant role of theophylline in electrically, chemically and kindling induced seizures and associated neurobehavioural paradigms was investigated. The possible role of nitric

oxide (NO) and its interactions with oxidative stress markers during theophylline effects were studied in details. Earlier we have shown the close relationship of theophylline with free radicals in its chemical/ pharmacological effects, which are indicative of its anti-inflammatory and immunomodulatory effects. The study was designed to assess theophylline induced anxiety and convulsions and to correlate with the anti-oxidant/pro-oxidant status in the brain. Theophylline and related drugs are indicated for respiratory disorders, but their narrow therapeutic index and toxicity potential restricts their wide usage. Anxiety and seizures generated by the drug are common neurotoxicity and mechanisms for the same are ill-defined. The present study critically evaluated the possible mechanism of theophylline induced anxiety in an attempt to find a viable antidote. Aminophylline (10 mg/kg) showed anxiolytic behaviour in EPM as shown by increased OAE and OAT. In open field, increase in latency and decrease in ambulations and rearings confirmed the same. Aminophylline, 100 mg/kg, i.p. induced an anxiogenic behaviour as shown by decreased OAE and OAT in EPM and increase in latency and decreased ambulations and rearings. These studies showed that low dose of aminophylline (10mg/kg) may act as anti-oxidant as shown by the decreased MDA level (lipid peroxidation) while aminophylline (100mg/kg) administration in high dose was associated with enhanced lipid peroxidation and lowered antioxidant defense in the brain thus, acting as pro-oxidant. These findings were further corroborated by reduced glutathione stores at this high dose. Such anxiogenic behaviour was attenuated by NO precursor, L-arginine and aggravated by L-NAME. Brain homogenates of such anxiogenic rats showed lower levels of NOx as compared to normal group. Biochemical markers supported these behavioural effects. The pharmacological data indicate that reactive oxygen species (ROS) and reactive nitrogen species (RNS) are involved in theophylline induced neurobehavioural changes *viz.* anxiety and suggest a potential role for antioxidants and NO modulators for prevention of adverse effects of theophylline at higher doses.

14. Pharmacological studies on the role of NO in stress adaptation in rats

Effects of acute and repeated restraint stress (RS) on biological responses were investigated in experimental animals. The molecular basis of stress tolerance is of considerable importance for devising strategies for drug therapy in such situations. The present study evaluated the effects of RS 1 h or 6 h, and their modulation by nitrergic agents on neurobehavioural and oxidative stress markers in rats. Exposure to acute RS induced behavioural suppression (in elevated plus maze), elevated plasma corticosterone levels (HPLC), and induced immune suppression (adaptive immune markers), and NO modulators (mimetics and synthesis inhibitors) differentially influenced these changes. Acute RS (1 h or 6 h) reduced open arm entries (OAE) and open arm time (OAT) in the elevated plus maze test — which were attenuated by the NO precursor, L-arginine but not influenced appreciably by the NO synthase inhibitor, L-NAME. These behavioural changes were associated with differential changes in brain NO metabolites (NOx) but consistently reduced GSH and raised MDA levels in comparison to the control group. Further pharmacological and biochemical data also showed that NO may also be involved in the cellular/molecular events resulting in stress tolerance. Repeated stress (RS) exposure attenuated acute stress responses and these were associated with parallel changes (relative elevations) in plasma and brain NO metabolite (NOx) levels. Pretreatment with NO modulators influenced these stress markers and also modulated the biochemical parameters studied. Following RS 1 h×10 the neurobehavioural suppression and changes in brain oxidative stress markers were less pronounced as compared to the acute RS (1h) group indicating adaptation. L-arginine pretreatment facilitated this adaptation to chronic RS (1h). Interestingly RS 6 h×10, induced the severe behavioural suppression and aggravation of MDA and NOx levels, *i.e.*behavioural responses were completely abolished, corticosterone responses were erratic, as compared to the single RS (6 h) group, and L-NAME pretreatment tended to protect against these chronic RS induced aggravations. These results suggest that acute and chronic RS induces duration/intensity dependent neurobehavioural and oxidative injury which are under the differential regulatory control of NO. This work was awarded the prestigious Uvnas Prize of the Indian Society of Pharmacology in its Annual Conference held at Hyderabad in November, 2010.

15. 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

The objective of the study is to evaluate the signal transduction mechanism involved in stress-induced immunomodulation with special reference to NO-ergic pathways. 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

the effects of NO modulators were assessed on the immune system. It forms an integral part of body defense mechanisms and consists of humoral and cell mediated immune responses. The effectors of cellular immunity are cytotoxic T cells that kill virally infected cells or tumour cells by direct contact. The effectors of humoral immunity are antibodies, which are generated by B cells and eliminate antigens by complement fixation, antibody directed cell cytoxicity etc. Our studies indicated differential response in humoral and cell mediated immunity on exposure to both acute and repeated stress situations. In the delayed type of hypersensitivity (DTH) reaction, a well validated test for assessment of cell mediated immune function, it was found that in RS(x5) suppressed paw oedema. Keyhole limpet hemocyanin (KLH) is a highly immunogenic and stable T-cell dependent antigen, and RS(x15) led to the suppression of antibody (IgG). IgG antibodies have multiple functions including opsonization of antigens for phagocytosis by macrophages and neutrophils, antibody dependent cell mediated cytotoxicity involving natural killer cells and feedback inhibition of B cell activation. Suppression of antibody titers is therefore suggestive of the fact that exposure to repeated stress leads to compromised humoral function. Cytokines play a key role in bidirectional communication between the neuroendocrine and immune systems. T-helper 1(Th1) and T-helper 2(Th2) cells represent two subpopulations of CD4+ T cells, which can be differentiated by their cytokine profiles. It is now recognised that the Th1/Th2 balance is important for immunoregulation. Th1 cells produce interferon-g (IFN-γ) and IL-2, which induce differentiation of CD4+ T cells to Th1 cells and inhibit the proliferation of Th2 cells. In contrast, Th2 cells secrete interleukin-4 (IL-4), IL-6 and IL-10, which induce differentiation of Th2 cells and inhibit Th1 cells. Both Th1 and Th2 cells secrete GM-CSF and TNFα. Th1 activation contributes to cell-mediated immunity whereas Th2 activation favours the humoral immune response. In the present study, RS(x15) suppressed IFN-γ as well as IL-4 levels - indicating that repeated stress exposure induces dysregulation of the Th1/Th2 cytokine profile. The differential alteration of these immune parameters was closely paralleled by the changes in nitrosative markers by exposure to RS(x15). NO mimetics alleviated the stress induced immune suppression while L-NAME aggravated the same. However, 7- NI was found to aggravate immune suppression. It is possible that the observed effect of NO on immune parameters may be mediated by CNS. NO mimetics may be modulating stress induced immunological parameters *via* influencing the release and synthesis of some central neurotransmitters such as GABA.

16. 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 established bronchodilator for the treatment of bronchial asthma and other obstructive airway diseases. However, its narrow therapeutic index and the resultant adverse drug reaction (ADR) profile have considerably restricted its therapeutic use**.** Theophylline induced ADRs include gastrointestinal effects like nausea, dyspepsia, CVS effects like cardiac arrhythmias, and CNS excitation in the form of anxiety and seizures. Further, factors like age, smoking, congestive heart failure, other diseases, and concurrent use of other drugs - all could contribute to alterations in theophylline kinetics. These factors all necessitate therapeutic plasma level monitoring to avoid toxicity. 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 are conducting clinical studies to compare the safety and efficacy of low dose theophylline against its standard dose used in the clinic which may eventually help to rationalise drug therapy with this effective and pharmacoeconomically viable agent.

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

During stressful condition, a host of neurotransmitters, including endogenous opioids (mainly enkephalin and endorphin), corticotropin releasing factor, serotonin and catecholamines are released to act at multiple levels within the brain. Endogenous opioids have a critical role in a variety of physiological situations, and complex interactive mechanisms during acute and chronic administrations have been proposed. Recent evidence suggests that nitric oxide (NO), implicated in the regulation of a number of physiologic and pathogenic processes, is involved in the development of morphine effects. Several studies have implicated the NMDA/

NOS system in the regulation of morphine tolerance. Opioid-NO interactions may be helpful in delineating strategies for combating such associated problems linked to opioid/morphine overuse. Stress is a multi-system phenomenon in which behavioural and immunological homeostasis is disturbed. Thus, the proposed study has therapeutic relevance and may provide newer insights for developing meaningful strategies to combat stress related psychopathological effects more effectively by modulating the Opioid-NO interactions after single and repeated administrations. There is evidence indicating that endogenous opioids act by attenuating or terminating stress responses as a defensive action of the organism. Therefore, endogenous opioids could represent major modulatory systems in the adaptation of an organism to chronic stress, balancing the response demands that the stressor places on the brain with the potentially detrimental effects. Thus, the proposed study has therapeutic relevance and may provide newer insights for developing meaningful strategies to combat stress related psychopathological effects by modulating the Opioid-NO interactions after single and repeated administrations.

Physiology

Research

1. Combined effects of acute elevation of left atrial pressure and high altitude exposure on RAR activity

The main objectives of this study were to identify the sensory mechanism responsible for the exaggerated respiratory symptoms reported in climbers who are unacclimatised but have clinical or sub – clinical cardiac problems and to investigate whether substance P (SP) has any role in it. Adult rabbits weighing 2-3 kg housed in separate enclosures in the animal house and provided with food and water *ad libitum* were used as experimental animals. The experiments were performed on two groups of animals – *Group I* (Control), and *Group II* (Acute exposure to high altitude – height, 15,000 feet and duration of exposure, 12 hrs). *Group I* breathed room air. *Group II* were exposed to the desired height and duration in a high altitude simulation chamber. RAR activity was recorded in both the groups after anesthesia. Acute elevation of left atrial pressure was produced by partial obstruction of the mitral valve by introducing a balloon in the left atrium. The left atrial pressure was increased in steps of 3 and 6 mmHg each for a period of 1 min.

Group I (Control)

The basal RAR activity in this group of animals was 4.75±0.30 impulses/breath. On raising the left atrial pressure by 3 and 6 mmHg., the RAR activity increased to 8.96±0.41 and 12.06±0.59 impulses/breath respectively. The percentage increases in RAR activity were 94.32±14.74 and 163.2±23.96 respectively. The increases in RAR activity were significant with both increments in left atrial pressure ($p<0.001$). Additionally, the RAR activity during the 3 and 6 mmHg increments in left atrial pressure were significantly different from each other ($p<0.001$).

On repeating the study after the administration of CP - 96345 (NK-1 receptor blocker), it was observed that during elevation of left atrial pressure by 3 and 6 mmHg, the percentage increases in RAR activity were 51.46±15.42 and 75.23±17.58 respectively. The increases in RAR activity were significant with both increments in left atrial pressure ($p<0.05$ and $p<0.001$ respectively). Additionally, the RAR activity during the 3 and 6 mmHg increments in left atrial pressure were not significantly different from each other.

When the RAR responses to graded increases in left atrial pressure before and after CP -96345 were compared, it was observed that the increase was significantly less during elevation of left atrial pressure by 6 mmHg ($p<0.05$).

Group II (Acute exposure to high altitude)

In this group of animals, there was a significant increase in the basal activity of the RARs and it was 8.19±0.65 impulses/ breath. On raising the left atrial pressure by 3 and 6 mmHg, the RAR activity increased to 15.05±1.27 and 20.87±1.32 inpulses/breath respectively. The percentage increases in RAR activity were 85.42±4.94 and 161.9±17.94 respectively. The increases in RAR activity were significant with both increments in left atrial pressure ($p<0.001$). Additionally, the RAR activity during the 3 and 6 mmHg increment in left atrial pressure were significantly different from each other ($p<0.01$).

On repeating the study after the administration of CP - 96345 (NK-1 receptor blocker), it was observed that during elevation of left atrial pressure by 3 and 6 mmHg the percentage increases in RAR activity were 56.75±9.93 and 100.5±10.67 respectively.

When the RAR responses to graded increases in left atrial pressure before and after CP -96345 were compared, it was observed that the increase was significantly less during elevation of left atrial pressure by 3 and 6 mmHg ($p<0.05$).

As there was a significant change in the basal RAR activity between the two groups, the RAR responses with both the increments in left atrial pressure in *Group II* were also expressed as percentage changes from the basal value in *Group I*. Now in *Group II*, the respective percentage increase in RAR activity was 216.9±26.86 and 339.4±27.81. These increases were significantly different from the corresponding percentage increase in *Group I* for increments in left atrial pressure of 3 and 6 mmHg ($p<0.01$ and $p<0.001$ respectively).

Similarly, the RAR responses to graded increments in left atrial pressures in *Group I* and *Group II* after CP-96345 were expressed as percentage changes from the basal value in *Group I* before CP -96345 and compared. In *Group I* during both the increments in left atrial pressure, the percentage increases in RAR actively were 52.93±13.74 and 75.33±8.30 respectively and the corresponding responses in *Group II* were 170.9±8.96 and 226.6±23.60 respectively. On comparison, it was observed that the percentage increases were significantly different from each other with both the increments in left atrial pressure ($p<0.001$).

These results demonstrate that during acute elevation of left atrial pressure as in exercise, there is significant stimulation of RARs. This stimulation is not only due to an increase in the hydrostatic pressure in the pulmonary microvasculature but also due to SP produced in the lung. During high altitude exposure, the increase in the basal RAR activity is due to pulmonary congestion as evidenced by histology. The augmentation in RAR activity during acute elevation left atrial pressure is due to additional pulmonary congestion caused by both an increase in hydrostatic pressure and SP production. It is proposed that the RARs may function as the sensory mechanism for the exaggerated respiratory symptoms reported in climbers who are unacclimatised but have clinical or sub – clinical cardiac problems.

2. Continuation of the work on the behaviour of slowly adapting pulmonary vagal sensory receptors during free radical induced airway hyper-reactivity

The main objective of the present study is to investigate whether there is a change in the behaviour of airway slowly adapting receptors (SARs) in a guinea pig model of asthma. The hypothesis behind the study is that as SAR stimulation causes bronchodilation, their activation in this model may produce a symptom relief.

Guinea pigs, weighing 400-500 gm housed in the animal house and provided with food and water *ad libitum* were used as experimental animals. They were divided into three groups of 4 each – *Group I* (Control), *Group II* (sensitised and challenged with ovalbumin) and *Group III* (Xanthine xanthine oxidase inhaled). In each group after anesthesia, airway slowly adapting receptor (SAR) activity was recorded. Then histamine inhalation was given starting with 0.02 mg/mL and doubling 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. In *Group II*, Guinea pigs were sensitised with ovalbumin. Four weeks after sensitisation, these animals were anesthetised and basal airway mechanics was recorded. Afferent activity from SAR was recorded also. Then, the animals were challenged with ovalbumin and observed for early asthmatic response. In *Group III*, an inhalation of xanthine (0.1%) for 1 min followed by an inhalation of xanthine oxidase (1U/mL) for 1 min was given. The changes in afferent activity and changes in airway mechanics were recorded continuously.

In the *control group (Group 1),* increasing dose of histamine aerosol did not increase the SAR activity significantly. There was, however, a dose dependent increase in SAR activity, when successive doses of histamine were administered. The percentage increases in the SAR activity were not found to be significant as compared to their corresponding control values.

In *Group 2,* after ovalbumin challenge, there was an increase in the SAR activity as compared to the corresponding control value. Thereafter, there was a dose dependent increase in the activity of SARs when successive doses of histamine were given. Again, the percentage increases in the SAR activity were not found to be significant as compared to their corresponding control values.

In *Group 3,* after xanthine-xanthine oxidase inhalation, there was an increase in the SAR activity as compared to the corresponding control value. Thereafter, there was a dose dependent increase in the activity of SARs when successive doses of histamine were given. Again, the percentage increases in the SAR activity were not found to be significant as compared to their corresponding control values.

In all the three groups, there was a dose dependent increase in airway resistance when successive doses of histamine were given. However, in the control group, the 50% rise in airway resistance occurred at a much higher dose of histamine (0.320 ± 0.074 mg/mL) as compared to that in the ovalbumin challenge group (0.100 ± 0.013 mg/mL) and the difference was significant ($p<0.05$). In the xanthine-xanthine oxidase group

also, the 50% rise in airway resistance occurred at a much lower dose of histamine (0.120 ± 0.023 mg/mL) which was also significantly different from that of control group ($p<0.05$).

The results indicate that SARs may not contribute significantly to the symptom relief in asthma. Additionally, they are not stimulated by *in vivo* generation of free radicals.

3. Obstructive sleep apnoea, oxidative stress and metabolic syndrome

The main objectives of the present study are to measure the oxidant-anti-oxidant status to see the beneficial effects of the anti-oxidant, N-acetylcysteine (NAC) and to determine the insulin resistance and blood pressure changes in patients with obstructive sleep apnoea syndrome (OSAS) (confirmed by polysomnography).

Among the 2163 new patients attending the OPD at VPCI, 25 patients who satisfied the inclusion, exclusion criteria and who had an Epworth sleepiness score ESS) >10 were included in the study. Of these 25, 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 30 days. In the other group (NAC group), the patients were put on NAC (600 mg x TDS) for 30 days 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 and for insulin resistance. Blood pressure was measured at the start and end of the study also.

The mean age of the patients was 56±3 years in the placebo group and 53±2 years in the NAC group. The body weight and the BMI did not change in both the groups after the treatment period. Both the systolic and diastolic blood pressures were raised in patients of both the groups. However, in the NAC group alone, the systolic blood pressure decreased significantly after the treatment period. There was a tendency for a decrease in the diastolic pressure also. The insulin resistance decreased significantly in this group after the treatment with NAC. In the NAC group alone, there were significant decreases in the ESS, the apnoea related arousals, AHI, number of apnoeic episodes, number of oxygen desaturation episodes, total snore time, number of snore episodes and the CPAP pressure required to keep the upper airway patent. In patients of both the groups, there was a significant increase in lipid peroxidation products and a significant decrease in total reduced glutathione. A significant reversal in their levels was noted in the NAC 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 NAC has therapeutic potential in them.

4. 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.

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 (Digital and Film).

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

A new 64 slice CT scanner was installed in place of the older single slice scanner. A total of 2258 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	1038
PNS CT	1075
Others	57
CT guided FNAC	28
Total	**2258**

***(ii)* Ultrasound Unit**

A total of 596 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	270
Abdomen USG	220
USG guided FNAC	106
Total	**596**

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

A total of 23644 X-ray examinations were done during the period as per the details given in Table 3. Of these, 20718 X-ray examinations were done on digital system and 2926 were done on X-ray films.

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

Examination	**Number**
Total X-rays	**23644**
Digital X-Ray	
Chest X-ray (adult)	15640
Chest X-ray (child)	1386
PNS X-ray	3692
Total Digital X-ray	**20718**
FILM X-Ray	
Chest X-ray (adult)	2501
Chest X-ray (child)	425
Total Film X-ray	**2926**

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

The newly installed 64 multi-slice CT Scanner.

Institute celebrated the Republic Day Parade function on 26th January 2011.

Respiratory Allergy and Applied Immunology

Research

1. Clinical, serological and radiological characteristics of patients with allergic bronchopulmonary aspergillosis (ABPA)

Allergic bronchopulmonary aspergillosis (ABPA) is an immunologically mediated lung disease resulting from complex hypersensitivity reaction to antigens of the *Aspergillus.* To identify ABPA in asthmatics is important because in untreated ABPA continuing hypersensitivity and inflammation progress to irreversible lung destruction.

To study clinical, serological and radiological characteristics of patients diagnosed to have ABPA at a tertiary pulmonary care set up in North India and to find the differences in the above characteristics when patients are further classified based on radiological criteria.

Retrospective analysis of 112 cases of ABPA diagnosed in a unit of Department of Respiratory Medicine of our Institute between 1997 and 2008 was done. History, clinical findings, serological reports (viz., serum total IgE, specific IgE and IgG against *Aspergillus fumigatus* and serum precipitins to *Aspergillus* antigens) and skin test reactivity with *Aspergillus* spp. of these patients were recorded. Also, the findings on chest radiogram and HRCT thorax were analysed. The patients were divided into three groups as ABPA serologic positive (ABPA-S), ABPA with central bronchiectasis (ABPA-CB), and ABPA with central bronchiectasis and other radiologic features (ABPA-CB-ORF) based on HRCT thorax findings. These three groups were compared for their characteristics and relevant statistical analysis was done.

The 112 patients of ABPA evaluated were between age 6 yrs and 75 yrs with duration of symptoms varying from six months to 50 yrs. Forty-three (38.4%) patients had history of Anti- tuberculosis treatment. There were 38 (33.92%) patients in ABPA-CB-ORF group, 49 (43.75%) in ABPA-CB and 25 (22.32%) in ABPA-S groups. The mean of duration of symptoms was longest in the ABPA-CB-ORF (15 yrs) followed by ABPA-CB (7 yrs) and ABPA-S group (5 yrs) respectively, although the difference was not statistically significant. The spirometry parameters did not show any statistically significant difference in the three groups. Skin test reaction of type I was positive in all the patients. ABPA-CB-ORF group had highest values of mean serum total IgE levels (14,330 IU/mL) followed by ABPA-CB (3,700IU/mL) and ABPA-S (1,020IU/mL) and difference was statistically significant. In case of specific IgE against *Aspergillus fumigatus* highest values were seen in ABPA-CB-ORF group followed by ABPA-CB and ABPA-S groups (42.24 kU/L, 20.65 kU/L and 3.44 kU/L respectively) (p value<0.05). Also, serum precipitins against *Aspergillus* spp. were positive in ABPA-CB-ORF in 92% followed by ABPA-CB (79.6%) and ABPA-S (68%) (p value<0.05).

A significant proportion of patients of ABPA are still misdiagnosed as tuberculosis. ABPA-CB-ORF and ABPA-CB groups represent an advanced stage of the disease as these had longer duration of symptoms as well as higher levels of serological markers of hypersensitivity against *Aspergillus* compared to ABPA-S. Hence, patients need to be diagnosed and treated early so as to prevent the progression to ABPA-CB-ORF and ABPA-CB which are more severe forms of the disease.

2. Sarcoidosis in North Indian population – a retrospective study

Sarcoidosis is a systemic glaucomatous disease of unknown origin most commonly involving lungs. Sarcoidosis is frequently misdiagnosed in developing countries like India due to its clinico-radiological resemblance to tuberculosis. Hence, the study was undertaken with the aim of studying the clinico-radiological profile of acidosis in the Indian context.

A retrospective study of patients diagnosed to have acidosis during the period 2001-2009 at one of the respiratory units at VPCI was conducted. A detailed analysis of clinical parameters, radiological findings and bronchoscopic findings were done.

Out of the 95 sarcoidosis patients, 60% were more than 40 yrs old. Females comprised of 55.78% patients. 28.42% patients had been misdiagnosed as tuberculosis before coming to our clinic. Cough was the most common presenting symptom. Joint symptoms were seen in 28.42% patients, but cutaneous involvement was

"36th Workshop on Respiratory Allergy: Diagnosis and Management" held on 7th-11th February 2011. *Dignitaries on the dais (left to right)*: Dr V.K. Vijayan, Director, VPCI; Dr Jolly Rohtagi, Dean, Faculty of Medical Sciences, University of Delhi, Delhi; Dr A.B. Singh, Emeritus Scientist; IGIB, Delhi; Prof. Raj Kumar, Organising Secretary of the Workshop.

Faculty and participating delegates of "36th Workshop on Respiratory Allergy: Diagnosis & Management" held on 7th-11th February 2011.

seldom seen. Clubbing was rare and respiratory crackles at lung bases were seen in 47.38%. Pulmonary function test (PFT) showed restriction with impaired diffusion in about 57.89% patients. The most common radiological feature was bilaterally symmetrical hilar lymphadenopathy. Transbronchial lung biopsy (TBLB) had a very high diagnostic yield (88.23%).

3. Prevalence of obstructive sleep apnoea amongst middle aged chronic obstructive airway disease (COPD & Asthma) patients by a home based sleep and its relation to atopy

A study to estimate the prevalence of sleep disorders (OSA) in middle aged COAD patients (COPD & persistent asthma) presenting at the tertiary level chest clinic (VPCI) through a home based sleep study and its relation to atopy.

A total of 400 cases of COAD (328 asthmatics and 72 COPD) who presented at the OPD of VPCI in the study were included. Diagnosed cases of asthma (diagnosis was based on the guidelines, reversibility of more than 12% or increase of 200 mL in FVC or FEV_1 after 20 microgram of inhaled salbutamol) and COPD (diagnosed) as per GOLD guidelines presenting/taking treatment in OPD of the Institute were included in the study. Written consent was taken from the patients after explaining the procedure. Written consent from institutional ethical committee was also obtained. The age of the asthmatic patients was more than 20 years where as for COPD patients the age was more than 40 years. Atopic status was determined by means of skin prick testing with a panel of common aeroallergens. A positive skin prick test reaction was defined as the presence of a wheal 3 mm or greater than the wheal size of the control (saline) with surrounding erythema. All the patients were evaluated for symptoms of obstructive sleep apnoea having cardinal symptoms of excessive daytime sleepiness, sleep, fragmentation and loud habitual snoring. An Epworth sleepiness scale (ESS) scoring was done. Clinical examination and the relevant investigations were done.

A total of 400 (229 male and 171 female) patients of COPD and asthma have been studied from January 2010 to December 2010. Maximum number of patients were between 31-40 years 93 (23.25%), followed by 41-50 years 82 (20.50%) and 21 30 years 74 (18.50%). 328 patients wre asthmatics out of which 169 were male and 159 were female. 72 patients were COPD of which 60 were male and 12 were female. The durations of illness of asthmatic and COPD patients were 7.9 years and 7.7 years respectively. Patients of asthma and COPD had rhinitis and nasal problems in 54.26% (178/ 328) and 59.72% (43/72) respectively. Questionnaire based sleep study was conducted in all the patients of asthma and COPD. ESS was positive in 11.50% (46) in patients of COAD (asthma + COPD). ESS showed maximum positivity in 31-50 years of age. ESS was positive in 10.67% (35/328) of asthma and 13.88% (10/72) of COPD patients. By Berlin Questionnaire method, the sleep study scored positive in 18.25% (73/400) patients of which 82.19% (60/73) were asthmatic and 17.80% (13/73) were COPD patients. Based on Berlin Questionnaire maximum patients with sleep apnoea were in 31-50 years of age. Berlin Questionnaire was positive in 18.29% (60/328) of asthmatic and 18.05% (13/72) of COPD patients. Skin prick test was done in 209 patients and 155 (74.16%) were found positive and the remaining patients were found 25.84% (54) negative. The maximum positivity was found in asthmatic patients. 139/155 (89.68%) compared to COPD patients 16/155 (10.32%).

4. Assessment of peripheral skin thickness by ultrasound (Dermascan) in patients of interstitial lung disease (ILD)

Ultrasound B-scan, a newly introduced technology with advanced equipment is used for the non-invasive measurement of skin lesions. Though skin lesions have been explained in a few interstitial lung diseases like sarcoidosis, scleroderma and others, the skin involvement has not been discussed in case of other ILD's like idiopathic pulmonary fibrosis and non specific interstitial pneumonitis pattern. The study is done to evaluate the peripheral skin thickness (volar aspect of left forearm) in patients with ILD.

Twenty patients with interstitial lung disease [ILD – mainly non specific interstitial pattern (NSIP)] aged 25-65 years were included in the study. A total of twenty normal persons (n=20) form *Group 1* and a total of twenty ILD patients form *Group 2* (n=20). The Dermascan was done on the volar aspect of the left forearm at a particular distance from the elbow joint. The skin thickness was measured by ultrasound images obtained with a 20 MHz Ultrasonic Device (Dermascan C, Cortex Technology, Hadsund, Denmark) in B mode.

The mean value of the peripheral thickness of the skin and their pixel values of both groups were compared with the paired t-test. The skin thickness measured in the volar aspect of the left forearm (mm, mean±SEM) in

the control group (*Group 1*) and *Group 2* (ILD patients) was 1.465±0.04 and 1.167+0.02 and their 'p' value is 0.0207, which is statistically significant. The echogenic pixels determined by ultrasound (mean±SEM) in *Group 1 vs Group 2* was 6791 ± 380.4 *vs* 4649 ± 376.1 and their p value is 0.0003, which is statistically significant. The p value for the ages between the groups was not statistically significant.

This study, the first of its kind, has found significant reduction in skin thickness in ILD patients, compared to the control group. From the study, it is suggested that there may be inflammation in the skin in addition to the pulmonary involvement which needs further study. Further studies will be planned in future to see the effect of steroids in this group of patients.

5. Analysis of skin reactivity to various common aeroallergens by skin prick test in respiratory allergy patients [Bronchial Asthma (BA) and Allergic Rhinitis (AR)]

The analysis has been done to find out the most common aeroallergens and their prevalence in respiratory allergy patients.

A retrospective analysis of skin prick test in bronchial asthma and allergic rhinitis for the last two and half years was done. Totally 250 patients were analysed, (60 tests in each patient equivalent of 15,000 tests) and the analysis was mainly concerned with, the most common aeroallergen, their prevalence, least common aeroallergen and side effects during the test.

The age of the patients in the study is between 10 to 70 years, with 74.4% of patients in 2nd to 4th decade and 10% of patients above 50 years. The sex percentage of the study is 57.2% of males which is slightly higher than females (42.8). The percentage of patients with both BA and AR is 61.6%, BA alone is 17.2% and AR alone is 21.2%. The most and least common aeroallergens found were Mosquito (50.5% of patients) and Ehretia (2%) respectively. The allergens positive in more than 10% of patients in the pollen group were Cenchrus (14% - most common aeroallergen in this group) and Pennisetum. In the weeds group the most common allergen is Gynandropis (24.4), other allergens in the group positive in more than 15% patients is Ageratum, Amaranthus, Argemone, and Brassica. The allergen most common in the trees group is Holoptelia (20.5%), others above 10% positive in this group is Cassia, Prosopis, Ricinus and Salvadora; in the dust group the most common is house dust (31.7%). The most common allergen in groups- fungi, insects and others is Rhizopus (9.6%), Mosquito (50.5%) and Silk (9.2%) respectively. The positive rate of allergens in insect group with Cockroach (male), Cockroach (female), Housefly, Riceweevil and Moth is 34.5%, 33.7%, 46.5%, 26.1% and 49% respectively. Out of 250 patients only two patients presented with side effects, one with giddiness and other with excessive itching. Both patients settled with symptomatic treatment. The most and least common aeroallergens found were mosquito (50.5% of patients) and Ehretia (2%) respectively.

6. Impact of indoor respirable particulate matter on respiratory allergy in children in India - an exposure response study

Respirable particulate matter leading to great risk to human health because they can be breathed more deeply into the lungs and are more toxic than larger particles.

The present study was took place at industrial, residential and urban village locations of Delhi, India with aim to identify the impact of indoor respirable particulate matter (PM5) on respiratory allergy in children (7-15 years).

PM5 is the particulate matter with an aerodynamic diameter of equal to or less than 5 mm size. Demographic profiles and respiratory symptoms of children were collected by the help of questionnaire. The pulmonary function test of children was performed by using spirometer and PEFR was measured by peak flow meter. Indoor PM5 were determined by using cyclone attached handy air sampler (Low volume sampler).

A total of 3456 children were examined of which 59.2% children were male and 40.8% female. 34.8% children were exposed by environmental tobacco smoke. 31.2 % children's families were using biomass fuels (coal, wood, kerosene and cow dung cakes) for cooking and 68.8% were using liquefied petroleum gas. Diagnosis of asthma, rhinitis and upper respiratory tract infection (URTI) was present in 7.7%, 26.1% and 22.1% children, respectively. The mean level of indoor PM5 was 191.67±104.5 µmg/m3 in Delhi and it was higher in industrial areas (245.50±95.48 µmg/m3) followed by residential (207.17±90.90 µg/m3) and urban villages (102.84±66.69 µmg/m3). The mean level of indoor PM5 was statistically significantly high in the

houses where children had asthma (p=0.001), rhinitis (p=0.001) and URTI (p=0.001). High concentration of indoor PM5 was significantly (p=0.006) associated with environmental tobacco smoke in industrial areas. The mean level of indoor PM5 was also significantly (p=0.001) high in the houses where families used biomass fuels for cooking compared to families used liquefied petroleum gas for cooking.

Present study concluded that high concentration level of respirable particulate matter (PM5) may cause respiratory allergy among children.

7. Effect of pulmonary rehabilitation on systemic inflammation, functional parameters and muscle cross section area in COPD

Pulmonary rehabilitation has an important role in COPD management. This study evaluates effect of pulmonary rehabilitation on systemic inflammation, muscle cross sectional area and other functional parameters in patients of COPD.

To evaluate the levels of high sensitivity C Reactive Protein (hs-CRP), Mid thigh Cross Sectional Area on CT ($MTCSA_{CT}$) and 6-minute walk distance (6MWD) before and after pulmonary rehabilitation in patients of COPD.

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

Levels of hs-CRP changed from $5.70_{\pm}1.83_{\mu}g/l$ to $5.751.79_{\mu}g/l$ in control group [p=0.733] and from $5.861.97_{\mu}g/l$ to $3.831.66_{\mu}g/l$ [p=0.024] in test group. Mean values of $MTCSA_{CT}$ changed from $10502.912576.13cm^2$ to $10701.012634.50cm^2$ in control group [p=0.261] and from $10617.952735.22cm^2$ to $11380.131949.46cm^2$ in test group [p=0.031].

Mean values of 6MWD changed from 379.2371.84m to 382.4568.69m in control group [p=0.181]and from 388.9272.47m to 446.7443.04m in test group [p=0.025]. The difference of means between control and test groups after pulmonary rehabilitation was significant for hs-CRP, $MTCSA_{CT}$ and 6MWD. Positive correlation was obtained between $MTCSA_{CT}$ and 6MWD [r=0.7, p=0.034].

Pulmonary rehabilitation causes significant improvement in muscle cross sectional area and functional parameters in COPD patients along with significant reduction in systemic inflammation.

Respiratory Medicine

The Department is involved in the patient care (Outdoor and Indoor), research on different aspects of respiratory diseases and teaching of the postgraduate students in the subject - Pulmonary Medicine (MD and DTCD) of University of Delhi. Beside routine lectures, clinical demonstrations along with seminars, clinical meetings and journal clubs, daily ICU meetings and mortality meetings were conducted regularly.

Research

1. Bronchial anthracofibrosis (BAF)

Bronchial anthracofibrosis (BAF) is an emerging pulmonary disease recognised just over a decade ago. The demographic clinical, radiological profile and bronchoscopic features peculiar to BAF are highlighted. This article further discusses the postulated causes and associated clinical conditions with BAF and emphasises the need to characterise and recognise it as a distinct clinical disorder. An extensive search of the literature was performed in the *Medline/PubMed* and other databases with key terms "anthracosis", "biomass fuels", "bronchial anthracofibrosis", and "pulmonary tuberculosis". A total of 17 studies and 6 case series/ reports describing 1320 patients with bronchoscopically confirmed BAF were documented. It was predominantly seen in elderly housewives in rural areas with long standing exposure to biomass fuel and was associated with respiratory diseases like tuberculosis, chronic obstructive pulmonary disease, pneumonia and malignancy. Exposure to biomass fuel smoke emerged as the main causative factor but possibility of an occupational lung disorder was also raised. Characteristic clinical, CT-thorax and bronchoscopic features of BAF were identified and it's differentiation from endobronchial tuberculosis and bronchogenic carcinoma was described. BAF, as a pulmonary disease is yet to be highlighted in both developing and developed countries. Currently, BAF is diagnosed only on bronchoscopy whereas a suitable noninvasive diagnostic modality would enable rapid diagnosis and increased recognition. Approach to the patients with BAF needs to be evolved and grave hazards of biomass fuel usage must be emphasised.

2. Hypersensitivity to the fruit mango

Although mango is consumed in huge amounts in India, hypersensitivity phenomenon to the fruit mango is a distinct rarity. Published data was reviewed and documentation of the current knowledge on allergic manifestations to the fruit mango was done. There are two distinct clinical presentations of hypersensitivity reactions caused by mango *viz.* the immediate hypersensitivity reaction presenting as anaphylaxis, angioedema, erythema, urticaria, wheezing dyspnoea and the late reaction presenting as contact dermatitis and periorbital oedema An extensive search of the literature was performed in *Medline/PubMed* with the key terms "mango", "anaphylaxis", "contact dermatitis", "cross-reactivity", "food hypersensitivity", "oral allergy syndrome" and "urticaria". A total of 17 reports describing 22 patients were documented, including ten patients with immediate hypersensitivity reaction and twelve patients with delayed hypersensitivity reaction to mango. Ten of these patients (four with immediate reaction; six with delayed reaction) were from geographical areas cultivating mango, including two from India. Twelve patients (six with immediate reaction; six with delayed reaction) were from the countries where large scale mango cultivation does not occur. The clinical features, pathogenesis and diagnostic modalities of both these presentations are highlighted. The fruit mango can cause immediate and delayed hypersensitivity reactions, as also "oral allergy syndrome". Although rare, it can even result in a life threatening event. Reactions may even occur in individuals without prior exposure to mango, owing to cross reactivity. It is imperative to recognise such a phenomenon early so as to avoid potentially severe clinical reactions in susceptible patients.

Respiratory Virology

Research

1. Detection of the novel pandemic 2009-H1N1 influenza virus in hospitalised patients

The recent outbreak of pandemic H1N1 2009 viruses all over the world created panic and posed an acute threat to human health. Soon after its emergence (April 2009) in Mexico and USA, the virus rapidly spread across the nations putting the health authorities of all affected countries in trouble. In this outbreak situation, a real-time RT-PCR assay was standardised in our laboratory, as per the CDC guidelines, for the detection of the pandemic H1N1 2009 strain that circulated around the world causing colossal loss of human life. The assay was performed to detect the HA gene for the identification of pandemic influenza virus. The primers and probes were tested against a panel of known negative controls, positive controls and on control RNA isolated from the HeLa cell line for quality control. The assay offered rapid identification of the pandemic H1N1 virus at even very low viral loads that are negative by the traditional RT-PCR and was found to be most useful molecular assessment tool against the pandemic H1N1 virus. India detected its first case in the month of May 2009, while we reported our first and second positive cases referred by Vishwanathan Chest Hospital, VPCI on 13th August 2009. Apart from our routine specimen collection from suspected swine flu cases, National Centre for Disease Control (NCDC) sent large number of samples for H1N1 testing at our laboratory. A total of 982 samples were collected between the periods August, 2009 to March, 2011 and tested for pandemic H1N1 with the real-time RT-PCR out of which 540 samples tested positive (54.98 %) for the influenza A virus. Of the total positive cases, pandemic H1N1 virus was 211 (21.48 %) and influenza A (unsubtyped) virus was 329 (33.5 %). The laboratory remained open 24x7 and the results were declared within 24 hours to cope up with the emergency relief of the critical ILI patients admitted at different hospitals of Delhi. As per WHO, we are now in post pandemic phase and there is still fair chances of this virus reverting back with unpredictable severity.

2. Comparison of *SYBR Green I* and *TaqMan* Real-time RT-PCR formats for analysis of HA gene of influenza A viruses

The outbreak of novel pandemic H1N1-2009 virus and its rapid spread worldwide has once again proved the ability of influenza A viruses to cause severe infection, raising serious concern about our pandemic preparedness. The present study was designed to evaluate the sensitivity and specificity of two chemistries of real-time RT-PCR (with the use of fluorescent *SYBR Green I* dye and specific *TaqMan* probe) for detection of the HA gene of human influenza A viruses. Influenza A viral strains (A/PR/8/34-H1N1, A/Delhi/1/2009-H1N1 and A/Udorn/307/72-H3N2) were procured from CDC to perform the calibration curve analysis for each viral strain. The different dilutions of the virus were subjected to real-time RT-PCR analysis by both the chemistries and their sensitivity and specificity was compared. We also validated the diagnostic accuracy of both the PCR formats on 80 clinical specimens from patients presenting with influenza-like-illness between the periods August 2010 to September 2010 from various hospitals of Delhi.

Our results suggest that the *TaqMan* chemistry has better sensitivity as compared to the *SYBR Green I* with an average difference of 2 Ct values however it was observed that the *SYBR Green I* assay was simpler, economical and readily available. Although its specificity was beaten due to its non specific nucleic acid binding activity, we showed that it can be a better alternative to the *TaqMan* assay as a preparedness measure for any future outbreak management.

3. 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 the membrane protein, M1, as well as an integral membrane protein, M2. M2 is a, 92 amino acid, unique protein that is present in influenza A and B viruses and functions as a proton channel and is essential to viral replication. The virus enters the infected cell by endocytosis, and the interior of the virion must become acidified while it is contained in the endosome as a prerequisite for release of genetic material to the cytoplasm. The proton channels serve this acidification function. Thus, the major objective of this research work is the post transcriptional gene silencing of M2 ion channel of influenza virus to inhibit its replication. The gene to be targeted was PCR amplified after standardisation. The amplified genes were cloned in pGEMT vector and then subcloned in an expression vector pSec Tag 2B. The expression analysis of the M2 ion channel has been done both at gene and protein level by performing SDS-PAGE and western blot for the target protein. The catalytic nucleic acids are designed based on the secondary structures of RNA derived from RNA M-FOLD software. Following the synthesis of these catalytic nucleic acids the cloned genes are now being targeted to elucidate the silencing efficacy of these synthesised biotechnological tools. The protocol is in progress and results are yet to be obtained.

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

Nasal/throat swabs and nasopharyngeal aspirates were collected from the out patients at emergency rooms, and from patients with acute respiratory tract infection at various hospitals in Delhi during the pandemic period. The viral RNA was extracted using the viral RNA extraction kit and all specimens were subjected to amplification of the M genes by the conventional RT-PCR and Real time RT-PCR as per WHO recommendations for confirmation of the pandemic H1N1 (2009) influenza viruses and seasonal influenza viruses. The PCR products were sequenced for confirmation of their origin. Blood samples of individuals (with prior written permission) who were infected from pandemic or seasonal influenza were collected and serum was separated and checked for the antibody titer by ELISA.

Madin Darby Canine Kidney (MDCK) cells were grown in minimum essential medium (MEM) supplemented with 10% fetal calf serum (FCS) and antibiotics (100 U Penicillin/mL and Streptomycin 100 µg/mL). Clinical samples that were positive by Realtime RT-PCR were propagated in MDCK cells and allantoic cavity of 10-day-old embryonated chicken egg. Inoculated MDCK cells were maintained in MEM containing 2 µg/mL TPCK treated trypsin at 37 ºC/5% CO_2 and eggs were incubated at 37 ºC for 48 hours followed by 12 hour incubation at 4 ºC. The infected cells were observed regularly and the supernatant were collected and subjected to HA test using 0.5% fowl RBCs at regular intervals. The allantoic fluid of the inoculated eggs was also harvested and subjected to HA test. Both the collected fluids were titrated by HA test and then stored in aliquots at -80 ºC for further use.

B95-8 marmoset cell lines, release virus into the culture supernatant which is than used as the source of EBV. The serum titer is a critical factor for the generation of monoclonal antibodies (mAbs) from peripheral blood mononuclear cells (PBMCs). A higher titer of the antibody of interest is indicative of a greater chance for the production of mAbs. The serum samples are being screened by ELISA using whole inactivated virus (Pandemic influenza 2009 (H1N1) and seasonal influenza virus) as antigen.

5. Construction and characterisation of functional ScFv antibodies against NP and NS1 proteins of pandemic influenza A 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. The primers have been designed for the amplification of NP and NS1 full length genes by polymerase chain reaction (PCR). The genomic RNA from the reference strain (A/PR/8/34 (H1N1)) of the influenza virus has been isolated and the NS1 and NP genes have been amplified by PCR using gene specific primers. The genes are currently being cloned for their expression in bacterial as well as mammalian systems.

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

The NS1 gene of influenza A virus is the only non-structural gene encoded by Segment 8 of the negative strand segmented genome. NS1 protein is reported to be associated with several regulatory functions during the viral replication cycle. This protein inhibits export of poly-A containing mRNAs from the nucleus, giving preference to the viral RNA transport. The gene has been shown to play an important role in splicing of pre-mRNA by binding to the stem bulge region of U6 small nuclear RNAs (snRNAs). It also suppresses interferon response in virus infected cells leading to unimpaired viral replication.

Based on the role of NS1 gene in promoting viral replication, we have down regulated this gene by using RNAi phenomenon. In the current research work, the viral replication inhibition was studied using siRNAs targeted against the conserved regions of the NS1 gene of influenza A virus. The NS1 gene of A/PR/8/34 (H1N1) was amplified and cloned in pcDNA3 expression vector. Further, siRNAs were designed using the siDIRECT software. The NS1-pcDNA3 clone was co-transfected with various concentrations of the designed siRNAs ranging from 30 to 60 pmoles in MDCK cells and same concentrations of siRNAs were also transfected with the whole virus (Influenza A/PR/8/34) to study the inhibition of virus replication. RT-PCR and real-time RT-PCR followed by western blot analysis confirmed an increase in inhibition of the expression of NS1 gene with an increase in the concentration of siRNA. The maximum inhibition (75%) of the virus replication was observed at 50 pmoles of siRNA.

To confirm the inhibitory effect of the siRNA on the NS1 gene expression of influenza A virus, we designed and tested the mutated versions of siRNAs having a single point mutation. Both the wild-type and mutated siRNAs were transfected in MDCK cells at same molar concentration (50pmole each) followed by influenza A virus infection. The RT-PCR analysis of the total RNA isolated from the MDCK cells revealed that the mutated siRNAs offered no protection against the influenza A virus. The study confirmed that the inhibition of NS1 gene of influenza A virus was due to the RNA interference offered by the synthesised siRNAs.

7. Assessment of M1 epitope of influenza virus fused to protein transduction domain (PTD) of HIV as an antiviral candidate

The M1 gene of influenza virus codes for the matrix protein which is essential for assembly of virus particles in the host cells. Although the viral genome keeps mutating yet there are certain regions in this gene which are evolutionarily conserved among various strains. Some of these conserved regions have been found to act as epitopes in the host organism for the generation of immune response. We have hypothesised that if the oligo corresponding to these epitopes are cloned and expressed, the resulting proteins can be used for the development of immunity against this virus without the use of whole virus as a vaccine. In our study, the oligo corresponding to the conserved epitope of the M1 gene ($M1_{47-56}$) of influenza A virus was amplified and cloned upstream to the oligo corresponding to the protein transduction domain (PTD) of Tat of HIV. The recombinant vector was expressed in the CHO K1 cell line and the protein was purified using Ni-NTA Agarose column. Bone marrow was isolated from mice femur bone and differentiated into dendritic cells in the presence of GM-CSF and IL-4 in RPMI. The immature dendritic cells (DCs) were pulsed with the purified epitopic proteins and used for the generation of cytotoxic T lymphocytes (CTLs) from the T cells isolated from the PBMC of naïve uninfected mice. The cytokine assay was done with the supernatant of DC: T cell co-culture showed that IFN-g & IL-12 were predominantly secreted by the lymphocytes and this data partially confirmed that the M1 epitopic peptide was able to induce the Th1 response, thus, favouring the generation of CTLs. LDH assay was done for analysing the ability of *in vitro* generated CTLs to destroy the virus infected cells. The protective efficacy of CTLs was assessed by injecting the CTLs into mice *via* tail vein followed by virus infection [A/PR/8/34 (H1N1), A/New Caledonia/20/99 (H1N1) & A/Udorn/307/1972 (H3N2)]. The mock infected mice and untreated virus infected mice were taken as control. It was observed that the CTL injection led to 100% recovery from the pathogenic effect of viruses while the untreated virus infected mice could not survive for more than the nine days. To further confirm the effect of *in vitro* generated CTLs, four mice of each group were sacrificed at 4 days post infection and plaque assay and real time RT PCR was done with lung supernatants and lung RNA respectively. The plaque count in the lungs of CTL treated infected mice was reduced by about 65% in comparison to the untreated mice. The real time RT PCR performed with the lung RNA also revealed the same result. Thus, we concluded that the peptide ($M1_{47-56}$) presented on the DC surface elicited the generation of CTLs which could provide cross-protection against multiple strains of the virus.

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, respiratory medicine, mycology, pharmacology, physiology, virology, etc.

DTCD

Session 2009 - 2011	Session 2010 - 2012
Dr Richa Sareen	Dr Gaurav Jain
Dr Khushboo	Dr Aanchal Teotia
Dr Parminder Bir Singh	Dr Mandeep Singh
Dr Dinesh	Dr Aanchal Singh
Dr Bhola Singh	Dr Nirupam Sharma
Dr Jolsana Augustine	Dr Baljeet Singh Virk
Dr Suketu P. Dave *(Left on 16.2.2010)*	Dr Ambika Sharma
Dr Lokesh Kumar Garg	
Dr A.S. Sandhya	
Dr Ram Babu Sah	

MD Degrees (Awarded)

(Session: 2007-2010)

Name	Discipline
Dr Ravi Shekhar Jha	Pulmonary Medicine
Dr Nikhil Modi	Pulmonary Medicine
Dr Rahul Roshan	Pulmonary Medicine
Dr Sukanya Gangopadhyay	Biochemistry
Dr Shivika Juneja	Microbiology
Dr Dushyant Lal	Pharmacology
Dr Priti Deep Singh	Physiology

MD Theses (Submitted)

(Session: 2008-2011)

Sl No.	Name (Discipline)	Title of Theses	Supervisor(s)
1.	Dr Mansi Gupta (Pulmonary Medicine)	Study of cardiac autonomic dysfunction in chronic obstructive pulmonary diseases	Prof. S.K. Chhabra and Dr Vishal Bansal
2.	Dr R. Anandha Kumar (Pulmonary Medicine)	To compare the inflammatory mediator profiles, pulmonary function tests and skin reactivity in obese and non-obese bronchial asthma patients	Prof. Raj Kumar and Dr V.K. Vijayan
3.	Dr Sadananda Barik (Pulmonary Medicine)	Comparison of mometasone furoate and ciclesonide aqueous nasal spray in adult allergic rhinitis patients	Prof. S.N. Gaur and Prof. Raj Kumar
4.	Dr Senthil S. Kumar (Pulmonary Medicine)	Effect of pulmonary rehabilitation on systemic inflammation, oxidative stress and functional status in chronic obstructive pulmonary disease	Dr B. K. Menon, Dr V. K. Vijayan and Dr Vishal Bansal
5.	Dr Shweta Bansal (Pulmonary Medicine)	A study to evaluate the occurrence of metabolic syndrome in chronic obstructive pulmonary disease	Dr V. K. Vijayan
6.	Dr Sushma Manral (Biochemistry)	Effect of acetoxycoumarins and calcium channel blocking dihydropyrimidone derivatives on protein kinase C activity of lymphocytes in COPD patients	Prof. H.G. Raj, Dr V.K. Vijayan and Prof. S.K. Bansal
7.	Dr Ankit Gupta (Microbiology)	Epidemiological study and genetic diversity of PB1-F2 gene in influenza A virus isolates from Delhi and Kolkata	Dr Madu Khanna and Dr V.K. Vijayan
8.	Dr Sushil Bhagwat Shendge (Pharmacology)	Factors associated with poor asthma control and poor adherence to asthma treatment: self report by patients in emergency room	Dr Anita Kotwani and Dr V.K. Vijayan
9.	Dr Kanimohzi S. (Physiology)	Obstructive sleep apnoea, oxidative stress and liver function	Prof. K. Ravi and Dr V.K. Vijayan

MD Theses (Pursued)

(Session: 2009-2012)

Sl No.	Name (Discipline)	Title of Theses	Supervisor(s)
1.	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
2.	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
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 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
5.	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
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
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-Ist Year
(Session: 2010-2013)

Name	Discipline
Dr Mayank Saxena	Pulmonary Medicine
Dr Swati Behera	Pulmonary Medicine
Dr Seema Kumari	Pulmonary Medicine
Dr Kshitiz Aggarwal	Pulmonary Medicine
Dr Swapna R	Pulmonary Medicine
Dr Jitender Sharma	Biochemistry
Dr Dabet Rynga	Microbiology
Dr Razi Akhtar	Pharmacology
Dr Puneet Kumar	Physiology

PhD Awarded/Submitted

Sl No.	Name (Discipline)	Title of Theses	Supervisor(s)	Status
1.	Ms Prachi Gupta (Biochemistry)	Lipid rafts in bronchial asthma: a study on membrane lipid metabolism in asthmatic patients	Prof. S.K. Bansal and Dr V. K. Vijayan	Awarded
2.	Mr Rakesh Kumar Mishra (Biochemistry)	Experimental asthma: a study on transmembrane signalling in airway smooth muscles and peripheral blood lymphocytes during the development of airway hypersensitivity in guinea pigs	Prof. S.K. Bansal, Prof. S.K. Chhabra and Dr Ritu Kulshrestha	Awarded
3.	Mr Tapesh Kumar Tyagi (Biochemistry)	Studies on the novel enzyme acetoxy drug: protein transacetylase from mesophilic fungus Starkeomyces Sp.	Prof. H.G. Raj and Prof. R.K. Saxena (Microbiology Deptt., South Campus, University of Delhi)	Awarded
4.	Ms Amita Chandolia (Microbiology)	Functional analysis of *mce 4* genes of *Mycobacterium tuberculosis* H37Rv using antisense approach	Prof. Mridula Bose, Prof. Vani Brahmachari (ACBR, University of Delhi) and Dr Pawan Malhotra (ICGEB, New Delhi)	Awarded
5.	Ms Saakshi Pal Singh (Microbiology)	Studies on detection and characterisation metallo-beta-lactamases in clinical isolates of *Pseudomonas aeruginosa*	Prof. S.S. Thukral and Dr Malini Shariff	Awarded
6.	Ms Tanushree Barua (Microbiology)	Studies on detection and characterisation of AmpC B-lactamases in clinical isolates of *Klebsiella* spp. and *Escherichia coli*	Prof. S.S. Thukral and Dr Malini Shariff	Awarded
7.	Mr Abdul Yasir (Physiology)	Responsiveness of airway rapidly adapting receptors and oxidant-antioxidant status to cigarette smoke inhalation in normal and sensitised rabbits	Prof. K. Ravi and Prof. S.K. Chhabra	Awarded

Sl No.	Name (Discipline)	Title of Theses	Supervisor(s)	Status
8.	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 polyphnolic acetates as antituberculous drugs	Prof. H.G. Raj and Prof. M. Bose	Submitted
9.	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)	Submitted
10.	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	Submitted
11.	Ms Ruchi Bhagat (Physiology)	High altitude simulation on lung physiology and vagal afferent activity	Prof. K. Ravi and Dr Shashi Bala Singh (DIPAS, Delhi)	Submitted

PhD Theses (Pursued)

Sl No.	Name (Discipline)	Title of Theses	Supervisor(s)	Year of Registration
1.	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)	2007
2.	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
3.	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)	2008
4.	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
5.	Ms Kushal Grima (Microbiology)	Expression analysis and protein profiling of drug efflux transporters in clinical isolates of *M. tuberculosis*	Prof. Mridula Bose and Dr Mandira Varma	2009
6.	Ms Nisha Rathore (Microbiology)	Regulationof expression of *mce4* operon of *M. tuberculosis*: search for upstream promoter activity and regulatory proeins	Prof. Mridula Bose and Dr Mandira Varma	2009
7.	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 and Dr J.N. Banavalikar (RBIPMT, Delhi)	2010
8.	Mr Anupam Prakash (Microbiology)	A study of *Cryptococcus* species in immunocompromised patients	Dr. Anuradha Chowdhary and Prof. H.S. Randhawa	2010

Sl No.	Name (Discipline)	Title of Theses	Supervisor(s)	Year of Registration
9.	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
10.	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
11.	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
12.	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	2006
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.	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
16.	Dr Ritu Kulshrestha (Physiology)	Pathophysiological studies in bleomycin induced pulmonary hypertension and fibrosis in rat model	Prof K.Ravi and Prof A.K. Dinda (A.I.I.M.S., New Delhi)	2009

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

Sl No.	Name (Discipline)	Title of Theses	Supervisor(s)	Status
1.	Mr Amit Kumar Mehta (Biotechnology) University of Pune, Pune	Evaluation of choline as an anti-inflammatory agent for the treatment of asthma	Dr B.P. Singh, Dr Naveen Arora (IGIB, Delhi) and Prof. S.N. Gaur	Awarded
2.	Ms Deepsikha (Biotechnology) University of Pune, Pune	Studies on allergen specific immunotherapy in patients of respiratory allergy	Dr B.P. Singh, Dr Naveen Arora (IGIB, Delhi) and Prof. S.N. Gaur	Awarded
3.	Ms Shipra Gupta (Med. 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	Submitted
4.	Ms Anju Sharma (Biochemistry)	To investigate the effect of histone hyperacetylation on the expression of genes involved in lung carcinogenesis	Prof. Jayashree Bhattacharjee (Deptt. of Biochemistry, LHMC, New Delhi) and Dr Viswajeet Rohil	Pursued
5.	Ms Monika Joon (Microbiology)	Functional genemics 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
6.	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	Pursued

Distinguished Visitors

- Prof. Kaushik P. Patel, Department of Cellular and Integrative Physiology, University of Nebraska Medical Center, Omaha, NE, 68198-4575, Delivered a lecture entitled, "Central regulation of sympathetic outflow in heart failure" (Jun 10, 2010).

- Dr Mamta Chawla-Sarkar, NICED, Kolkata, visited the Department of virology for a ICMR Project surveillance work (August 20, 2010).

Awards/Honours

Dr V.K. Vijayan

- **President,** Indian College of Allergy, Asthma and Applied Immunology, Dehi (Up to December 2008).
- **Founder President,** South Asian Association of Allergy, Asthma and Clinical Immunology.
- **Founder President,** Society for Tobacco Control.
- **Founder Vice President**, Pulmonary Pathology Society of India.
- **Member,** Executive Council, University of Delhi.
- **Chair, Clinical Respiratory Medicine Assembly,** Asian Pacific Society of Respirology.
- **Vice President,** South Asia Thoracic Society.
- **Vice President,** World Lung Foundation-South Asia.
- **Member,** Scientific Advisory Group (SAG) for the Division of Non-Communicable Diseases (NCD), Indian Council of Medical Research (ICMR), New Delhi.
- **Member,** Scientific Advisory Committee, National Institute of Occupational Health (ICMR), Ahmadabad.
- **Member,** Scientific Advisory Committee, National Institute for Research in Environmental Health (ICMR), Bhopal.
- **Member** of a delegation constituted by the Department of Health Research, Ministry of Health and Family Welfare, Government of India to visit Bhopal in connection with the establishment of a New ICMR Research Centre at Bhopal.
- **Chairman,** Committee for developing a Vision Document for the National Institute for Research in Environmental Health (ICMR), Bhopal.
- **Member,** Task Force Group of the National Institute for Research in Environmental Health (ICMR), Bhopal.
- **Member,** Committee for Selection and Purchase for equipments for the National Institute for Research in Environmental Health (ICMR), Bhopal.
- **Member,** Expert-cum-Monitoring Group on Immuno-modulation, Department of Biotechnology, Department of Science and Technology, Government of India.
- **Member,** Board of Specialty in Infectious Diseases of Medical Council of India to develop curriculum in DM course in Infectious Diseases.
- **Co-Chair,** Assessment Board for promotion of ICMR Scientists under the Flexible Complementing Scheme for Scientists holding posts of Scientist "B" to Scientist "E".
- **Chairman,** Institutional Ethics Committee, LRS Institute of Tuberculosis & Respiratory Diseases, Mehrauli, New Delhi.
- **Executive Committee Member,** Tuberculosis Association of India, 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).
- **Member,** Editorial Advisory Board, *Chest* (Indian Edition), an official publication of the American College of Chest Physicians, U.S.A.
- **Member,** Editorial Advisory Board, *Thorax* (South Asian Edition), an official publication of the British Thoracic Society, U.K.

- **Member,** Editorial Board, *The Open Respiratory Medicine Journal*, an Open Access online Journal.
- **Member,** Editorial Board, World Allergy Organisation Journal.
- **Member,** Editorial Board, *Lung India*, an official publication of the Indian Chest Society.
- **Member,** Editorial Board, *Indian Journal of Tuberculosis*, an official publication of the Tuberculosis Association of India.
- **Member, Editorial Advisory Committee,** *Pulmon*, an official publication of the Academy of Pulmonary and Critical Care Medicine.
- **Member, Editorial Board,** *Indian Journal of Sleep Medicine*, an official publication of the Indian Sleep Disorders Association.
- **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, *Indian Journal of Bronchology*, an official publication of the Indian association for Bronchology.
- **Member,** Data Safety Monitoring Bureau (DSMB), Department of Biotechnology (DBT) project on "Efficacy and safety of immunomodulator *Mycobacterium w.* as an adjunct therapy in pulmonary tuberculosis".
- **Member,** Scientific Advisory Committee, New Delhi Tuberculosis Centre, New Delhi.
- **Chairman,** Project Review Committee for the Division of NCD in the field of Environment, ICMR, New Delhi.
- **Member,** Expert Committee of the Project Review Group (PRG) for Indo–US Project Proposals in the area of Environmental and Occupational Health, ICMR, New Delhi.
- **Member,** Technical Advisory Committee of the ICMR Centre for Advance Research in Environment-Air Pollution" at Sri Ramachandra University, Chennai.
- **Member,** Indian Sleep Board to certify Sleep Physicians in India through examination in association with American Academy of Sleep Medicine.
- **Member,** Selection Committee for the Award of Post-doctoral Research Fellowship of the ICMR, Nerw Delhi.
- **Referee** to assess the research contributions of a candidate for the Shanti Swarup Bhatnagar Prize 2010 of the Council of Scientific and Industrial Research (CSIR) in Medical Sciences.
- **Expert Member,** Management Committee for selection of candidates for fellowship of the "National Environmental Sciences Fellowship Programme" Ministry of Environment and Forests, Government of India.
- **Referee** to evaluate the suitability of the candidate for the ICMR award "Dr P.N. Raju Oration Award" for the year 2008.
- **External Expert,** Standing Selection Committee of Postgraduate Institute of Medical Education & Research, Chandigarh for selection of Professor, Pulmonary Medicine (Assured Merit Promotion) and Assistant Professor, Pulmonary Medicine (direct recruitment).
- **Inspector,** Medical Council of India to inspect the Department of Pulmonary Medicine of the Christian Medical College, Vellore to start MD in Pulmonary Medicine.
- **Inspector,** Medical Council of India to inspect the Department of TB & Chest Diseases at Sardar Patel Medical College, Bikaner for increase of seats in MD (TB & Chest) under Rajasthan University of Health Sciences.
- **Member,** Advisory Committee, INSA-ICMR-IOM-NIAID Workshop/meeting on tuberculosis.

Expert Committee Meetings

- Meeting of the Inspection Committee of University of Delhi regarding up gradation of School of Nursing to College of Nursing to recommend the BSc (Nursing) course at Holy Family Hospital, New Delhi on 8 April 2010.
- Expert Committee meeting of the Indo-US Consultative Meeting on "Research and Intervention Strategies for Indoor Air Pollution and Health" ICMR Headquarters. 29 April 2010.
- Ethics Committee meeting at LRS Institute of TB & Respiratory Diseases on 5 May 2010.
- Member, Meeting of the Committee of Ranbaxy Science Foundation to organize a Round Table Conference on "Sleep Medicine" in October 2010 at Department of Medicine, AIIMS, New Delhi on 7 May 2010.
- UCB Academy of Allergy Scientific Advisory Committee meeting at Hotel Taj Exotica, Goa on 23 May 2010.
- Delegate, Brain storming session on "Transgenic crops" organised by Indian Academy of Sciences, National Academy of Sciences India, Indian National Academy of Engineering, National Academy of Agricultural Sciences and National Academy of Medical sciences at Indian National Science Academy, New Delhi on 1 June 2010.
- Expert Committee on Indo-US Consultative meeting of Project Review Group (PRG) of ICMR on 6 July 2010.
- 1st meeting of the Scientific Advisory Committee, New ICMR Centre at Bhopal at ICMR Head Quarters, New Delhi on 20 July 2010.
- Selection Committee meeting to select Part-Time Consultants in various medical specialties for World University Scheme Health Centre, University of Delhi on 28 July 2010.
- Meeting convened by Secretary, Department of Health Research and Director General, ICMR, New Delhi, to discuss the modalities of establishment of a new ICMR Institute at Bhopal on 29 July 2010.
- Chairman, Project Review Committee meeting for the Division of NCD, ICMR, New Delhi, for the area of "Environment" to review Ad-hoc Research Schemes on 29 July 2010.
- Selection Committee meeting to select Deputy Registrars (4) of the University of Delhi on 30 and 31 July 2010.
- Chaired the Ethics Committee meeting of LRS Institute of TB & Respiratory Diseases, Mehrauli on 5 August 2010.
- Meeting convened by Director General, ICMR to discuss infrastructure development including equipments to be purchased at the proposed ICMR Centre at Bhopal on 24 August 2010.
- Meeting of the Purchase Committee for selecting equipments for the new ICMR Centre at Bhopal at ICMR Headquarters on 27 August 2010.
- Meeting convened by the Secretary, Ministry of Health and Family welfare, Government of India to review the situation arising out of Influenza A H1N1 and dengue and the preparedness of the identified hospitals in both Government and Private Sector in Delhi, AIIMS on 28 August 2010.
- Chaired a meeting of the Committee to develop a Vision document for the new ICMR Centre at ICMR Headquarters on 31 August 2010.
- Meeting of the Purchase Committee for selecting equipments for the new ICMR Centre at Bhopal at ICMR Headquarters on 1 September 2010.
- Meeting of the Purchase Committee for selecting equipments for the new ICMR Centre at Bhopal at ICMR Headquarters on 10-11 September 2010.

- Meeting of the Technical Advisory Committee of the ICMR Centre for Advance Research in Environment-Air Pollution" at Sri Ramachandra University, Chennai on 16 September 2010.
- Purchase Committee meeting to finalize the equipments to purchase for the proposed ICMR Centre at Bhopal, ICMR Headquarters, New Delhi on 17 September 2010.
- The 5th Advisory Committee meeting on MIC gas victims at Vallabh Bhavan, Bhopal as a Special Invitee on 22 September 2010.
- The First Task Force Group meeting in connection with ICMR proposed Research centre at Bhopal on MIC at Vallabh Bhavan, Bhopal on 22 and 23 September 2010.
- Indo-US Partnership meeting on Indoor Air Pollution and Health organized by ICMR from 27-29 September 2010 at Heritage Village, Manesar, Gurgaon, Haryana, India.
- Selection Committee meeting to select Scientist B at National Institute of Occupational Health (ICMR) on 13 October 2010 at Ahmadabad.
- Member, meeting of the Selection Committee for the Award of Post-doctoral Research Fellowship of the Indian Council of Medical research. 15 October 2010.
- First meeting of the "Expert-cum-Monitoring Group on Immuno-modulation" of Department of Biotechnology, New Delhi on 18 October 2010.
- Curriculum Development Committee meeting for the Specialty of DM in Infectious Diseases of Medical Council of India on 26 October 2010.
- UCB Academy of Allergy Scientific Advisory Committee meeting at Hotel Taj Lands End, Mumbai on 14 November 2010.
- Selection Committee for the selection of Radiation Safety Officer at University of Delhi on 18 November 2010.
- Chaired the Ethics Committee meeting of the LRS Institute of TB and Respiratory Diseases, New Delhi 25 November 2010.
- Meeting of the scientists to discuss various issues connected with the development of Science and Technology in the country and the issues that need to be addressed during the Twelfth Five Year Plan convened by Planning Commission and chaired by Dr Montek Ahluwalia, Vice Chairman, Planning Commission at Yojana Bhavan, New Delhi on 22 December 2010.
- Meeting of the Scientific Advisory Group (SAG) for the Division of Non-Communicable Diseases (NCD), ICMR, New Delhi 22-23 December 2010.
- Meeting of the Committee to finalize the specifications for the digital X-ray machine at ICMR National Institute for Research in Environmental Health, Bhopal convened by ICMR at New Delhi on 30 December 2010.
- Meeting of the Expert Committee to make recommendation for relaxation of rule with regard to eligibility for second BIPAP machine, DGHS, New Delhi on 30 December 2010.
- Chairman, Project Review Committee meeting for the Division of NCD, ICMR for the area of "Environment" to review Ad-hoc Research Schemes on 10 January 2011.
- Selection Committee for the selection of Veterinarian, Department of Zoology, University of Delhi on 20 January 2011.
- Meeting of the Equipment Committee of National Institute for Research in Environmental Health at ICMR Headquarters on 3 February 2011.
- Annual Review Meeting of the Technical Advisory Committee of the ICMR Centre for Advance Research in Environment-Air Pollution" at Sri Ramachandra University, Chennai on 21-22 March 2011.

Prof. S.N. Gaur

- Awarded **Fellowship** of International Medical Science Academy (IMSA), 2010.
- **Life Member,** Indian Science Congress Association, 2010.
- **Distinguished Services Award** 2010, of Geriatric Society of India, Nov., 12, 2010.
- **Editor,** *Indian Journal of Allergy, Asthma and Immunology*, an official publication of the Indian College of Allergy, Asthma and Applied Immunology.
- **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).
- **Secretary,** National College of Chest Physicians (India).
- **Secretary,** South Asia Association of Allergy, Asthma & Clinical Immunology (SAAAACI) from 2010.
- **Expert Member**, Committee on Prevention, Abatement and Control of Pollution, Ministry of Environment & Forest, Government of India.
- **Member,** Auto-immunity, Immunomodulation and Secondary Immune Deficiency Committee, *Anaphylaxis, Immunotherapy, Allergen Standardization and Allergy Diagnostic and Adverse Reaction to Food Allergy, Air Pollution and Indoor Allergen 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

- **Member,** Institutional Ethical Committee, Rajan BabuTB Hospital, Govt. of Delhi, Delhi.
- **Member,** Institutional Ethical Committee, Defence Institute of Physiology and allied Sciences (DIPAS), Defence Research Development Organisation (DRDO), Delhi.
- **Member,** Project Review Committee and Committee for Central Council for Research in Unani Medicine (CCRUM) archiving, Department of Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy (AYUSH).
- **Member,** Expert Committee, Central Council for Research in Homoeopathy, (AYUSH).
- **Expert,** Project Advisory Committee Member, Defence Research Development Organisation (DRDO), Delhi.
- **Member,** Expert Committee, Ministry of Chemicals and Fertilizers, Govt. of India, New Delhi.
- **Visiting Scientist,** Departments of Pharmacology, South Illinois University Medical School, Springfield, IL, USA (March 29-30, 2011).

Prof. Ashok Shah

- **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.*

- **Member,** Editorial Board, *Asia Pacific Allergy*.
- **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*.
- Awarded the **"ICS Dr. OA Sarma Oration Award 2010"** of the **Indian Chest Society**. Oration delivered at the 12th Joint National Conference of Pulmonary Diseases of the Indian Chest Society and the National College of Chest Physicians (India) NAPCON 2010. Jodhpur November 26-30, 2010. Oration on "Sarcoidosis and tuberculosis – an enigma".
- **President,** The Indian College of Allergy, Asthma and Applied Immunology.
- **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, 2010-11.
- **Member,** World Allergy Organisation, Audit & Finance Committee, for 2010-2011.
- **Member Society Representative** to Asia Pacific Association of Allergy, Asthma and Clinical Immunology (APAAACI) 2011-2013.
- **Expert Member,** Tuberculosis Association of India - Committee to review and revise the Recruitment Rules for the post of Director. New Delhi Tuberculosis Centre, October 2010.
- **Invited to inaugurate** the "Fortis Pulmonology Update 2010", NOIDA on December 19, 2010.
- **Medical Council of India Assessor** for inspection for MD (Infectious Diseases) at the Infectious Diseases and Beliaghata General Hospital (ID&BGH) under the West Bengal University of Health Sciences, Kolkata. Assessment conducted on November, 22-23, 2010.
- **Medical Council of India Assessor** for inspection ESI-PGIMSR, K.K. Nagar, Chennai for starting of MD (Respiratory Medicine) course under Dr. M.G.R. Medical University, Chennai. Assessment carried out on January 21, 2011.
- **Expert Member,** Selection Committee, DNB Respiratory Medicine, Vardhman Mahavir Medical College and Safdarjang Hospital, New Delhi on February 21, 2011.
- **Guest Faculty** to conduct the Clinical Presentation of DNB/ MD students of Delhi at the Lala Ram Sarup Institute of Tuberculosis and Respiratory Diseases, New Delhi, July 24, 2010.
- **Member**, Sub- Group - Respiratory Medicine, Core Committee of Experts, for Standard Treatment Guidelines, Ministry of Health and Family Welfare, Government of India.

Prof. S.K. Chhabra

- **Associate 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.

- Fellowship, American College of Chest Physicians.
- Awarded the **"NCCP-Dr Reddy's Chest Oration Award 2010"** of the National College of Chest Physicians (India) for contribution to Clinical Aspects of Respiratory Medicine. Oration delivered at the 12th Joint National Conference of Pulmonary Diseases of the Indian Chest Society and the National College of Chest Physicians (India) NAPCON 2010. Jodhpur November 26-30, 2010.

Prof. K. Ravi

- **Member,** Selection Committee, Recruitment and Assessment Centre, Defence Research Deveolpment Organisation, New Delhi.
- **Member,** Project Review Committee, Defence Research Deveolpment Organisation, New Delhi.
- **Member,** Life Sciences Research Board, Defence Research Deveolpment Organisation, New Delhi.
- **Member,** MCI inspection Committee for S.P. Medical College, Bikaner, Rajasthan.
- **Member,** Expert Committee for selection of Professor, AIIMS, New Delhi.
- **External Examiner,** MD (Physiology), AIIMS, New Delhi.
- Received **invitation** from Wolters Kluwer Publishing House for revising the chapter "Respiration" for Best and Taylor's Text Book of Physiology.
- Received **invitation** from Lambert Academic Publishing for writing a monograph on Oxidative stress and obstructive sleep apneas syndrome.

Prof. S.K. Bansal

- **Secretary**, Biotechnology Society of India.
- **Secretary**, Association of Clinical Biochemists of India (Delhi Chapter).
- **Member**, Academic Council of M.D. University, Rohtak, Haryana.
- **Panel of Experts,** Council of Science & Technology, U.P. Lucknow, for evaluation of research proposal for grant-in-aid.
- **Medical Council of India Assessor** for assessment of teaching facilities for increase of seats in M.D. (Biochemistry) under Annamalai University, on 27th December 2010.
- **External Examiner** for conducting the First Professional M.B.,B.S. Oral and Practical Examination in Biochemistry at Sardar Patel Medical College, Bikaner, 21st-23rd August 2010.
- **Examiner,** Ph.D. Thesis (Medical Biochemistry) Chhatrapati Sahu ji Maharaj Medical University, Lucknow.
- **Examiner,** M.D. (Biochemistry), Faculty of Medical Sciences, Delhi University, 2010-11.
- **Examiner,** M.D. (Biochemistry) Thesis, All India Institute of Medical Sciences, New Delhi, March 2011.

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 (NASI), 2010.
- **Secretary**, Society for Tobacco Control.
- **Member,** National Academy of Medical Sciences (MNAMS), 2010.
- **Member,** American Academy of Allergy, Asthma & Immunology.
- **Governing Council Member,** South Asia Thoraric Society (SATS).
- **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.

Dr Madhu Khanna

- **Editor**, *Indian Journal of Virology*.
- **Editor**, *Journal of Virology Research*.
- **Editor**, *International Journal of Immunology Research*.

Dr Anuradha Chowdhary

- Awarded **Travel Grant** for an advanced training in molecular epidemiology of pathogenic fungi at the Canisius Wilhelmina Ziekenhuis, Medical Centre, the Radboud University Nijmegen, The Netherlands March 20 - May 28, 2011.

Dr Anita Kotwani

- **Member,** Expert Committee, UGC, to evaluate the applications of Indian teachers/scholars for study-cum-research, exchange programme.
- **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.
- **Member,** National Working Group of the Global Antibiotic Resistance Partnership (GARP)-India.
- **Technical Supervisor,** WHO, for two projects on price and availability of children medicines in Chhatisgarh and Orissa States.
- Received **Poster Finalist Award** for paper "Antibiotic prescribing practices of primary care prescribers for diarrhea in New Delhi, India" submitted to International Society for Pharmacoeconomics & Outcome Research for ISPOR-AP Conference, Phuket, Bangkok, September 5-7, 2010.
- **Member,** Institute Ethics Committee, Dr B. R. Ambedkar Centre for Biomedical Research (ACBR), University of Delhi, Delhi.
- **Member,** Committee of Courses and Studies for Honours, Postgraduate and Research Studies in Biomedical Sciences of Dr B.R. Ambedkar Center for Biomedical Research, University of Delhi, Delhi.
- **Executive Member,** International Society for Pharmacoeconomics and Outcome Research (ISPOR), Indian Chapter.

Dr Kavita Gulati

- Awarded the **Uvnas Prize** of the Indian Pharmacological Society for Best paper published in the area of Biogenic amines and Autacoids, 43rd Annual Conference of the Indian Pharmacological Society, Hyderabad, December 10-12, 2010.
- Awarded **Travel Grant** by UGC, Govt. of India for participating in the 16th World Congress of Basic and Clinical Pharmacology (WorldPharma2010), Copenhagen, July 17-23, 2010.
- Awarded **Travel Grant** by ICMR, Govt. of India for participating in the World Congress on Steroids, Chicago, IL, USA, March, 2011
- **Visiting Scientist,** South Illinos University, Springfield, USA, March 30, 2011.
- **Expert,** Project Evaluation Committee, Central Council for Research in Homoeopathy, Department of Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy (AYUSH).

Dr Vishwajeet Rohil

- **External Expert,** Practical Examination / Viva Voce for B. Tech, Bioenergetics, Guru Gobind Singh Indraprastha University, Kashmere Gate, Delhi.

Dr Ritu Kulshrestha

- **Secretary**, Pulmonary Pathology Society of India (PPSI).
- **Treasurer**, Society for Tobacco Control.
- **External Examiner** for Annual examination in Pathology, Dept of Physiotherapy, Jamia Millia Islamia, Delhi, May 2010.

Ms Ashima Jain (MD Student)

- Awarded the **Sanjay Sardana Memorial Award** for best poster in "Immunodiagnostics" (by Ashima Jain, Abhimanyu, Kushal Grima, Mandira Varma–Basil and Mridula Bose) at the 3rd Annual Conference on "Microbial evolution-adaptations and challenges (MICRO-D-CON), March 26, 2011.

Mr Binod Kumar (PhD Student)

- **Silver Cash Award** worth 8000 RMB (Rs 50,000/) awarded for the best paper entitled, "Small interfering RNA (siRNA) mediated inhibition of influenza A virus replication in mammalian cell line" (by Kumar B, Kumar P, Rajput R, Khanna M) in the "4th DITAN International Conference on Infectious Disease (DICID)" held at Beijing, China, July 15-18, 2010.

Mr Rajesh Sinha (PhD Student)

- Awarded **Travel Grant** by DST for attending 41st Union World Conference on Lung Health, Berlin (Germany), November 11-15, 2010.

Ms Rashmi Pasricha (PhD Student)

- Awarded **Travel Grant** by DST for attending 41st Union World Conference on Lung Health, Berlin (Germany), November 11-15, 2010.

Sponsored Research Projects

Sl No.	Faculty Member (Department)	Title of Project	Funding Agency, Date of Sanction/Implementation and Duration	Budget (in Rs.)
1.	Prof. H.G. Raj (Biochemistry)	Studies on the synthesis of acyloxy polyphenols, the substrates for calreticulin transacylase: molecular mechanisms of acylation of functional proteins by acyloxy polyphenols utilising recombinant clones of C, P and N domains of calreticulin	DU/DST - Purse Grant University of Delhi December 11, 2009 (One year and three months)	11.80 Lakhs
2.	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
3.	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)	12.29 Lakhs
4.	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)	37.70 Lakhs
5.	Dr Vishwajeet Rohil (Clinical Biochemistry)	Studies on implications of epigenetic modulation due to histone hyperacetylation in tumor cells induced by drugs targeting protein acetylation system through a novel mechanism	U.G.C. January 18, 2010 (Three years)	9.90 Lakhs
6.	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
7.	Dr Anuradha Chowdhary (Medical Mycology)	Systemic mycoses in HIV positive patients: a study of species spectrum of etiologic agents, antifungal susceptibility pattern and epidemiologic aspects	I.C.M.R. March 1, 2009 (Three years)	23.36 Lakhs

Sl No.	Faculty Member (Department)	Title of Project	Funding Agency, Date of Sanction/Implementation and Duration	Budget (in Rs.)
8.	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
9.	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	DBT March 1, 2011 (Three years)	35.15 Lakhs
10.	Prof. Mridula Bose (Microbiology)	Functional characterisation of *lspA* gene of *Mycobacterium tuberculosis*: cloning, expression and its role during patho genesis	D.B.T. June 19, 2006 (Four years and six months)	23.42 Lakhs
11.	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
12.	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)	31.57 Lakhs
13.	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)	11.88 Lakhs
14.	Prof. Mridula Bose (Microbiology)	Role of *lspA* gene in the biology and pathogenesis of *Mycobacterium tuberculosis*	I.C.M.R. September 28, 2010 (Two years)	20.80 Lakh
15.	Dr Malini Shariff (Microbiology)	Evaluation of phenotypic and genotypic methods for the detection and characterisation of metallo-β-lactmasses in clinical isolates of *Pseudomonas aeruginosa*	C.S.I.R. November 20, 2007 (Three years)	15.01 Lakhs
16.	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
17.	Dr Mandira Varma (Microbiology)	Rapid identification of *Mycobacteria* to the species level by PCR restriction analysis in clinical samples	I.C.M.R. January 16, 2008 (Two years and four months)	10.62 Lakhs

Sl No.	Faculty Member (Department)	Title of Project	Funding Agency, Date of Sanction/Implementation and Duration	Budget (in Rs.)
18.	Dr Mandira Varma (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)	28.48 Lakhs
19.	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
20.	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 (Seven years)	3.99 Lakhs
21.	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 three months)	7.21 Lakhs
22.	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 (Four years)	28.29 Lakhs
23.	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
24.	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

Sl No.	Faculty Member (Department)	Title of Project	Funding Agency, Date of Sanction/Implementation and Duration	Budget (in Rs.)
25.	Dr Kavita Gulati (Pharmacology)	Experimental studies on the possible role of nitric oxide (NO) during acute and chronic morphine in normal and stressed rats	CSIR November 1, 2010 (Three years)	10.36 Lakhs
26.	HOD Pharmacology & Respiratory Medicine, VPCI	To augment the post-graduate teaching and research facilities in the Department under FIST Programme	DST January 19, 2011 (Five years)	42.50 Lakhs
27.	Prof. K. Ravi (Physiology)	High altitude simulation on rapidly adapting receptors (RAR) activity	D.I.P.A.S. March 13, 2009 (Two years)	5.04 Lakhs
28.	Prof. K. Ravi (Physiology)	Brain nitric oxide and high altitude stress	D.I.P.A.S. February 9, 2010 (Three years)	59.00 Lakhs
29.	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	WHO 15 June 2010 - 14 June 2011 (One year)	2.70 Lakhs
30.	Prof. Raj Kumar (Respiratory Allergy and Applied Immunology)	To study the prevalence of obstructive sleep apnoea amongst middle aged chronic obstructive airway disease (COPD and asthma) patients by a home based sleep study and atopy	U.G.C. December 3, 2009 (Three years)	11.55 Lakhs
31.	Dr Balakrishnan Menon (Respiratory Allergy and Applied Immunology)	Real time PCR based rapid detection of *Mycobacterium tuberculosis* from peripheral blood samples	D.B.T. December 18, 2007 (Three years)	7.20 Lakhs
32.	Dr Madhu Khanna (Respiratory Virology)	Multi-site monitoring of human influenza in India - Phase I	I.C.M.R. November 8, 2006 (Three years and nine months)	81.92 Lakhs
33.	Dr Madhu Khanna (Respiratory Virology)	A study of viral replication inhibition by down regulation of NS1 gene of influenza A virus	C.S.I.R. November 16, 2007 (Three years)	16.74 Lakhs
34.	Dr Madhu Khanna (Respiratory Virology)	Multi-site epidemiological and virological monitoring of human influenza virus surveillance network in India -Phase II	I.C.M.R. February 16, 2010 (Six months)	41.20 Lakhs

Sl No.	Faculty Member (Department)	Title of Project	Funding Agency, Date of Sanction/Implementation and Duration	Budget (in Rs.)
35.	Dr Madhu Khanna (Respiratory Virology)	Generation, characterisation & epitope mapping of recombinant human monoclonal antibodies against pandemic influenza 2009 (H1N1)	D.S.T. January 1, 2011 (Three years)	43.53 Lakhs
36.	Dr Ajit Kumar DST's SERC Fast Track Scheme for Young Scientist (Biochemistry)	Studies on molecular mechanismof calreticulin transacetylase (CRT Ase) catalysed activation of nitrc oxide synthase and its biological implications	D.S.T. January 04, 2008 (Three years)	19.94 Lakhs
37.	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
38.	Dr Ashima Anand (Principal Investigator) DST Project	A study of methods for reducing exertional breathlessness and increasing exercise capability	D.S.T. August 30, 2006 (Four years)	47.70 Lakhs
39.	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
40.	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 (Eleven years)	4.75 Lakhs

Orations/Guest Lectures

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
1.	Dr V.K. Vijayan	Obstructive sleep apnea: pathogenesis	V.P.C.I. University of Delhi	National Symposium on "Sleep Apnea: An Update" on the occasion of the 61st Foundation Day of the Vallabhbhai Patel Chest Institute Delhi April 5, 2010
2.	Dr V.K. Vijayan	Tropical pulmonary eosiniphilia	Sri Venkateswara Institute of Medical Sciences and Association of Physicians of India, Tirupati Branch	Sri Venkateswara Institute of Medical Sciences Tirupati May 17, 2010
3.	Dr V.K. Vijayan	Harmful effects of tobacco consumption	V.P.C.I. University of Delhi and Society for Tobacco Control	Symposium on the occasion of "World No Tobacco Day" Delhi May 31, 2010
4.	Dr V.K. Vijayan	Health issues in spaceflight and lunar surface	Environmental Medical Association	Conference on "Management of Respiratory Diseases in 2010" Mumbai June 13, 2010
5.	Dr V.K. Vijayan	Current guidelines for the management of COPD	Department of Medicine, All India Institute of Medical Sciences and Association of Physicians of India, Delhi State Chapter	Medicine Update 2010 New Delhi August 8, 2010
6.	Dr V.K. Vijayan	Diagnosis and management of community acquired pneumonia	Institute of Pulmocare & Research	8th All India Update on Pulmonary Medicine (Pulmocon-10) Kolkata September 5, 2010

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
7.	Dr V.K. Vijayan	Respiratory consequences of tobacco consumption	Tata Memorial Hospital	National Conference on Tobacco or Health Mumbai September 23-25, 2010
8.	Dr V.K. Vijayan	Tobacco cessation activities through tobacco cessation clinics: VPCI experience	All India Heart Foundation	"World Heart Day" India International Centre New Delhi September 26, 2010
9.	Dr V.K. Vijayan	Consequences of obstructive sleep apnoea	Ranbaxy Science Foundation and All India Institute of Medical Sciences	XXVI Round Table Conference on "Sleep Disorders: Wake-up call for Physicians" New Delhi October 9, 2010
10.	Dr V.K. Vijayan	Management of difficult asthma	Geetanjali Medical College and Hospital	44th Annual Conference of the Indian College of Allergy, Asthma and Applied Immunology (ICAAICON-2010) Udaipur October 22-24, 2010
11.	Dr V.K. Vijayan	Environmental lung diseases: an overview	V.P.C.I. University of Delhi, Pulmonary Pathology Society of India and the Pulmonary Pathology Society, Division of American Society of Investigative Pathology	International Conference on Pathology of Environmental Lung Diseases (POED 2010) Delhi November 29-30, 2010
12.	Dr V.K. Vijayan	Pulmonary eosinophilia: recent advances	Department of Pulmonary Medicine, P.D. Hinduja National Hospital	4th National Update in Respiratory Medicine 2010 Mumbai December 3, 2010
13.	Dr V.K. Vijayan	Sleep and obstructive sleep apnoea	Sree Chitra Thirunal Institute for Medical Sciences and Technology	4th National Conference of the Indian Society for Sleep Research Thiruvananthapuram December 13, 2010

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
14.	Dr V.K. Vijayan	Novel therapies in bronchial asthma	V.P.C.I. University of Delhi	1st Conference of South Asia Association of Allergy, Asthma and Clinical Immunology (SAAAACI - 2011) Delhi February 12-13, 2011
15.	Prof. S.N. Gaur	Immunotherapy for allergic diseases: present scenario	Geetanjali Medical College and Hospital	44th Annual Conference of the Indian College of Allergy, Asthma and Applied Immunology (ICAAICON-2010) Udaipur October 22-24, 2010
16.	Prof. S.N. Gaur	Global warming and respiratory health	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2010) Jodhpur November 26-30, 2010
17.	Prof. S.N. Gaur	Basic mechanism, clinical presentation and allergen specific immunotherapy in respiratory allergy	M.B.D. College	Indian Science Congress Chennai January 3-7, 2011
18.	Prof. S.N. Gaur	Subcutaneous immunotherapy) in management of allergy disorders	V.P.C.I. University of Delhi	1st Conference of South Asia Association of Allergy, Asthma and Clinical Immunology (SAAAACI - 2011) Delhi February 12-13, 2011
19.	Prof. S.N. Gaur	Global warming and effect on respiratory system	Department of Pulmonary Medicine, J.L.N. Medical College and Rajasthan Chapter of National College of Chest Physicians India	10th Annual Conference of the Rajasthan Chapter of National College of Chest Physicians India (NCCP RAJCON 2011) Ajmer February 26-27, 2011

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
20.	Prof. A. Ray	The philosophy of ayurveda and beyond	International Union of Pharmacology (IUPHAR)	16th World Congress of Basic and Clinical Pharmacology (WorldPharma 2010) Copenhagen, Denmark July 17-23, 2010
21.	Prof. A. Ray	Drug prescribing in extremes of age	I.S.F. Collehge of Pharmacy	National Symposium on Rational Drug Therapy and Clinical Trials Moga, Punjab October 29-30, 2010
22.	Prof. A. Ray	Delivered Prof. S.B. Pandey Memorial Oration Lecture on Nitric oxide: a novel neuromodulator and an endogenous adaptogen during stress	Indian Pharmacological Society	43rd Annual Conference of the Indian Pharmacological Society Hyderabad December 13-16, 2010
23.	Prof. A. Ray	Pharmacovigilance : an emerging concept	Maharaja Siurajmal Institute of Pharmacy	National Seminar on Pharmacy and Drug Therapy New Delhi January 21-22, 2011
24.	Prof. A. Ray	Nitric oxide: an endogenous adaptogen during stress	Dept. of Pharmacology, South Illinois University Medical School	Dept. of Pharmacology, South Illinois University Medical School, Springfield, IL, USA, March 30, 2011
25.	Prof. Mridula Bose	Overview of tuberculosis research in India	National Institute of Allergy and Infectious Diseases, National Institute of Health (USA) and University of Delhi, South Campus	Indo-US Programme on HIV STI Prevention Research, Indo-US Vaccine Action Programme, TB Scientific Review and Visit to India New Delhi December 2, 2010
26.	Prof. Ashok Shah	Managing upper airways inflammatory disease: allergic rhinitis and chronic rhinosinusitis	University of Aberdeen	Respiratory Airways Summit Hong Kong August 21-22, 2010

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
27.	Prof. Ashok Shah	Upper airways allergic disorders	Physicians Academic Society	Physicians Academic Society Rajouri Garden, New Delhi September 1, 2010
28.	Prof. Ashok Shah	*Aspergillus* related lung diseases	Association of Physicians of India, Uttarakhand Chapter	The Uttarakhand APICON 2010 Mussoorie September 18-19, 2010
29.	Prof. Ashok Shah	*Aspergillus* associated hypersensitivity respiratory disorder	Geetanjali Medical College and Hospital	44th Annual Conference of the Indian College of Allergy, Asthma and Applied Immunology (ICAAICON-2010) Udaipur October 22-24, 2010
30.	Prof. Ashok Shah	Human seminal plasma allergy	Allergy & Clinical Immunology Society (Singapore)	8th Asian Pacific Congress of Allergy Asthma and Clinical Immunology Singapore November 6-9, 2010
31.	Prof. Ashok Shah	Awarded the "ICS Dr O.A. Sarma Oration Award 2010" of the Indian Chest Society, Oration on "Sarcoidosis and tuberculosis - an enigma" Bronchopulmonary aspergillosis: clinical spectrum and diagnosis	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2010) Jodhpur November 26-30, 2010
32.	Prof. Ashok Shah	Upper airways allergic inflammatory disorders	Fortis Hospital	Fortis Pulmonology Update 2010 NOIDA December 19, 2010
33.	Prof. Ashok Shah	Allergic bronchopulmonary aspergillosis	Ex Student´s Association of the R.G. Kar Medical College	R.G. Kar Medical College 78th Reunion Scientific Seminar Kolkata December 19-22, 2010

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
34.	Prof. Ashok Shah	Upper airways allergic inflammatory disorders	V.P.C.I. University of Delhi	1st Conference of South Asia Association of Allergy, Asthma and Clinical Immunology (SAAAACI - 2011) Delhi February 12-13, 2011
35.	Prof. Ashok Shah	• Bronchial anthracofibrosis • How to write a paper?	Department of Pulmonary Medicine, J.L.N. Medical College and Rajasthan Chapter of National College of Chest Physicians India	10th Annual Conference of the Rajasthan Chapter of National College of Chest Physicians India (NCCP RAJCON 2011) Ajmer February 26-27, 2011
36.	Prof. S.K. Chhabra	Awarded the "NCCP-Dr Reddy´s Chest Oration Award 2010" of the National College of Chest Physicians (India) for contribution to Clinical Aspects of Respiratory Medicine Spirometry interpretation	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2010) Jodhpur November 26-30, 2010
37.	Prof. S.K. Chhabra	Control of bronchial asthma	V.P.C.I. University of Delhi	1st Conference of South Asia Association of Allergy, Asthma and Clinical Immunology (SAAAACI - 2011) Delhi February 12-13, 2011
38.	Prof. K. Ravi	Treatment of obstructive sleep apnoea: a translational approach	V.P.C.I. University of Delhi	National Symposium on Translational Research in New Drug Development Delhi January 12-13, 2011
39.	Dr Raj Kumar	• Smoking cessation - VPCI experience • How to set up a tobacco cessation clinic?	V.P.C.I. University of Delhi and Society for Tobacco Control	Symposium on the occasion of "World No Tobacco Day" Delhi May 31, 2010

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
40.	Dr Raj Kumar	• Smoking cessation - what physician should know? • Difficult asthma • Sublingual Immunotherapy	National Allergy Asthma Bronchitis Institute (NAAABI)	Seminar on Basics in Obstructive Lung Diseases Kolkata September 19, 2010
41.	Dr Raj Kumar	Smoking cessation in teritiary centre	Tata Memorial Hospital	National Conference on Tobacco or Health Mumbai September 23-25, 2010
42.	Dr Raj Kumar	Food allergy	Bangladesh Lung Foundation	International Conference on Lung Health Dhaka October 13-14, 2010
43.	Dr Raj Kumar	Food allergy	Geetanjali Medical College and Hospital	44th Annual Conference of the Indian College of Allergy, Asthma and Applied Immunology (ICAAICON-2010) Udaipur October 22-24, 2010
44.	Dr Raj Kumar	Food allergy in north India	National Chemical Laboratory	Seminar on Food Safety Issues with Special Emphasis on GM Food Pune November 14-16, 2010
45.	Dr Raj Kumar	Let us clean the air, it is never too late to help the COPD smokers	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2010) Jodhpur November 26-30, 2010
46.	Dr Raj Kumar	Food allergy in south Asia	V.P.C.I. University of Delhi	1st Conference of South Asia Association of Allergy, Asthma and Clinical Immunology (SAAAACI - 2011) Delhi February 12-13, 2011

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
47.	Dr Balakrishnan Menon	Diagnostic evaluation of asthma and COPD	Jaipur Golden Hospital	RESPIVISION-2010: Respiratory Update New Delhi June 27, 2010
48.	Dr Balakrishnan Menon	Radiological features of environmental lung disease	V.P.C.I. University of Delhi, Pulmonary Pathology Society of India and the Pulmonary Pathology Society, Division of American Society of Investigative Pathology	International Conference on Pathology of Environmental Lung Diseases (POED 2010) Delhi November 29-30, 2010
49.	Dr Balakrishnan Menon	Occupational lung diseases: current trends in imaging	Indian Radiology and Imaging Association (IRIA)	64th National Conference of the Indian Radiology and Imaging Association (IRIA) New Delhi January 28-31, 2011
50.	Dr Balakrishnan Menon	Drug allergy	V.P.C.I. University of Delhi	1st Conference of South Asia Association of Allergy, Asthma and Clinical Immunology (SAAAACI - 2011) Delhi February 12-13, 2011
51.	Dr Anita Kotwani	Community-based surveillance of antibiotic use in Delh	WHO-SEARO (South-East Asia Regional Office)	Inter Country Meeting on "Promoting Rational Use of Medicines" New Delhi July 13-15, 2010
52.	Dr Anita Kotwani	Adapting the WHO-HAI pricing methodology to suit the region and specific survey Symposium on Better Medicines for Children	Indian Pharmacological Society	43rd Annual Conference of the Indian Pharmacological Society Hyderabad December 13-16, 2010

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
53.	Dr Kavita Gulati	Regulatory issues involved during a clinical trial	Dept. of Pharmacology, Maharaja Sayajirao University of Baroda	Dept. of Pharmacology, Maharaja Sayajirao University of Baroda Vadodara April 2, 2010
54.	Dr Kavita Gulati	Clinical trials and their regulatory Issues	Dept. of Pharmacology, Saurashtra University	Dept. of Pharmacology, Saurashtra University Rajkot April 3, 2010
55.	Dr Kavita Gulati	Pharmacovigilance: a tool to assess the drug safety	I.P.G.A. at Maharaja Surajmal Institute of Pharmacy, Guru Gobind Singh Indraprastha University	Seminar on "New Paradigms in Pharmaceutical Sciences" New Delhi November 23, 2010
56.	Dr Kavita Gulati	Adverse drug reaction monitoring in patients of bronchial asthma and COPD with focus on methylxanthines	Indian Society for Rational Therapeutics and Society of Pharmacovigilance (India) and Lady Harding Medical College	International Conference on Pharmacovigilance and Rational Use of Medicine: an Integrated Approach New Delhi November 26-28, 2010
57.	Dr Kavita Gulati	Physiological and behavioural correlates of stress induced anxiogenesis in rats: possible role of free radicals	Indian Pharmacological Society	43rd Annual Conference of the Indian Pharmacological Society Hyderabad December 13-16, 2010
58.	Dr Kavita Gulati	Translational studies with a polyherbal agent in bronchial asthma: a reverse pharmacology approach	V.P.C.I. University of Delhi	National Symposium on Translational Research in New Drug Development Delhi January 12-13, 2011
59.	Dr Kavita Gulati	Neuromodulatory role of NO in anxiety and seizures	Defence Research & Development Establishment (DRDE)	Defence Research & Development Establishment (DRDE) Gwalior January 28, 2011

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
60.	Dr Vishal Bansal	Pulmonary rehabilitation in chronic obstructive pulmonary diseases	Centre for Physiotherapy and Rehabilitation Sciences, Jamia Millia Islamia	Symposium on Cardiopulmonary Rehabilitation New Delhi February 19, 2011
61.	Dr Ritu Kulshrestha	Autoimmune lung diseases	A.I.I.M.S.	International Academy of Pathology-Indian Division meet on ´Fluorescence in Pathology´ New Delhi May 21-23, 2010
62.	Dr Ritu Kulshrestha	Infectious pneumonias: continental contest	International Academy of Pathology	XXVIIIth International Congress of the International Academy of Pathology Sao Paulo Brazil October 10-15, 2010
63.	Dr Ritu Kulshrestha	Molecular diagnosis of lung cancer	Dept of Biosciences, Jamia Millia Islamia	CME on Recent Trends in Biosciences New Delhi November 13-14, 2010
64.	Dr Ritu Kulshrestha	Pathological approach to environmental lung diseases	V.P.C.I. University of Delhi, Pulmonary Pathology Society of India and the Pulmonary Pathology Society, Division of American Society of Investigative Pathology	International Conference on Pathology of Environmental Lung Diseases (POED 2010) Delhi November 29-30, 2010
65.	Dr Ritu Kulshrestha	Unusual tumour and tumour like lesions of the lung	International Academy of Pathology- Indian Division	Annual Conference of the International Academy of Pathology- Indian Division Hyderabad December 9-12, 2010
66.	Dr Ritu Kulshrestha	Diagnostic approach to bronchial biopsy	Fortis Escorts Hospital and Research Centre	CME on Multispeciality Approach to Bronchial Asthma Faridabad March 3, 2011

Conferences/Symposia/Seminars/Workshops/CMEs

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
1.	Dr V.K. Vijayan	Organising Chairman Chaired a session on Sleep apnoea	V.P.C.I. University of Delhi	National Symposium on "Sleep Apnea: An Update" on the occasion of the 61st Foundation Day of the Vallabhbhai Patel Chest Institute Delhi April 5, 2010
2.	Dr V.K. Vijayan	Organising Chairman	V.P.C.I. University of Delhi	Workshop on "Nuts and Bolts of Sleep Laboratory" Delhi April 6, 2010
3.	Dr V.K. Vijayan	Chairman, Technical Session	United Nations Environment Programme (UNEP) in co-ordination with the Ozone Cell, Ministry of Environment and Forests and Central Drugs Standard Control Organization (CDSCO), Ministry of Health and Family Welfare, Government of India	National Consultative Workshop on Policy and Regulations for "CFC MDI-Phase-out Transition Strategy Implementation and Adoption of CFC Alternatives in India" New Delhi May 20, 2010
4.	Dr V.K. Vijayan	Lecture on: Tobacco control and health	V.P.C.I. University of Delhi and Society for Tobacco Control	Training in Behavioural Counselling: Tobacco Cessation Delhi July 22, 2010
5.	Dr V.K. Vijayan	Organising Chairman Chaired a session on Smoking related small airways disease and BAL in environmental lung disease	V.P.C.I. University of Delhi, Pulmonary Pathology Society of India and the Pulmonary Pathology Society, Division of American Society of Investigative Pathology	International Conference on Pathology of Environmental Lung Diseases (POED 2010) Delhi November 29-30, 2010

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
6.	Dr V.K. Vijayan	Lecture on: Novel therapies in bronchial asthma	Association of Physicians of India	APICON CME Programme, 66th Annual Conference of Association of Physicians of India (APICON 2011) Ahmedabad January 6-9, 2011
7.	Dr V.K. Vijayan	Organising Chairman Chairman a session on Translational research	V.P.C.I. University of Delhi	National Symposium on Translational Research in New Drug Development Delhi January 12-13, 2011
8.	Dr V.K. Vijayan	Organising Chairman	V.P.C.I. University of Delhi and Morarji Desai National Institute of Yoga	National Symposium and Workshop on Yogic Management of Pulmonary Diseases Delhi January 27-28, 2011
9.	Dr V.K. Vijayan	Chairman of a Seminar on Lung lavage	Post Graduate Institute of Medical Education and Research	16th Annual Conference of Indian Association for Bronchology Chandigarh February 4-6, 2011
10.	Dr V.K. Vijayan	Organising Chairman Lecture on: Difficult asthma	V.P.C.I. University of Delhi and Institute of Genomics and Integrative Biology	36th Workshop on Respiratory Allergy: Diagnosis and Management Delhi February 7-11, 2011
11.	Dr V.K. Vijayan	Organising Chairman Chaired a sessions on • Basic immunology/ genetics • Exhaled nitric oxide: basic aspect and clinical use	V.P.C.I. University of Delhi	1st Conference of South Asia Association of Allergy, Asthma and Clinical Immunology Delhi February 12-13, 2011

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
12.	Dr V.K. Vijayan	Organising Chairman Chaired a session on Influenza and para influenza viruses	V.P.C.I. University of Delhi	2nd Annual Conference of the International Association of Medical and Pharmaceutical Virologists Delhi March 3-5, 2011
13.	Dr V.K. Vijayan	Chaired a session on Integrated therapeutic approach towards nasobronchial interaction in allergic airway disease	U.C.B. India Private Ltd	U.C.B. India Private Ltd Hotel Metropolitan New Delhi March 13, 2011
14.	Dr V.K. Vijayan	Lectures on: • Health hazards of tobacco consumption • Tobacco control in India	Department of TB & Respiratory Diseases, Jawaharlal Nehru Medical College and Society for Tobacco Control	Workshop on Tobacco Cessation Aligarh March 15, 2011
15.	Dr V.K. Vijayan	Organising Chairman	V.P.C.I. University of Delhi	National Seminar on Thoracic Imaging Delhi April 5, 2011
16.	Dr V.K. Vijayan	Organising Chairman	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2011) Jodhpur November 27-30, 2011
17.	Prof. S.N. Gaur	Lectures on: • History taking and clinical aspects of respiratory allergy • Immunotherapy -	V.P.C.I. University of Delhi and Institute of Genomics and Integrative Biology	36th Workshop on Respiratory Allergy: Diagnosis and Management subcutaneous Delhi February 7-11, 2011
18.	Prof. S.N. Gaur	National Advisor	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2010) Jodhpur November 26-30, 2010

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
19.	Prof. A. Ray	Organising Secretary Chaired Session V	V.P.C.I. University of Delhi	National Symposium on Translational Research in New Drug Development Delhi January 12-13, 2011
20.	Prof. A. Ray	Participated in a panel discussion on New drug development in viral infections	V.P.C.I. University of Delhi	2nd Annual Conference of the International Association of Medical and Pharmaceutical Virologists Delhi March 3-5, 2011
21.	Prof. A. Ray	Presented a paper on Neurosteroids attenuate stress-induced anxiogenesis in rats: possible role of free radicals	Elsevier and the Endocrine Society	International Congress on Steroid Research Chicago, USA March 27-29, 2011
22.	Prof. Mridula Bose	Lecture on: Emerging infectious diseases	Miranda House, University of Delhi	Workshop on Rapid Molecular Diagnostic Techniques Delhi September 11, 2010
23.	Prof. Mridula Bose	Organising Chairperson Lecture on: Introduction to the Workshop and molecular diagnosis of tuberculosis	Dept. of Microbiology, V.P.C.I., University of Delhi and Indian Association of Medical Microbiologists (IAMM), Delhi Chapter	Workshop on "Molecular Diagnosis and Typing of Bacterial Respiratory Pathogens" on the occasion of annual conference of IAMM Delhi March 25, 2011
24.	Prof. Ashok Shah	Chaired the Monthly clinical meeting	National College of Chest Physicians (India), Delhi Chapter	Monthly Clinical Meeting of the National College of Chest Physicians (India) India Habitat Centre New Delhi April 18, 2010
25.	Prof. Ashok Shah	Chaired a session on Management of COPD	The Centre for Respiratory Diseases	Respivision IV Jaipur Golden Hospital New Delhi June 27, 2010

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
26.	Prof. Ashok Shah	Chaired the Monthly clinical meeting	National College of Chest Physicians (India), Delhi Chapter	Monthly Clinical Meeting of the National College of Chest Physicians (India) India Habitat Centre New Delhi July 18, 2010
27.	Prof. Ashok Shah	• Chaired a Symposium on Occupation Asthma • Chaired ´Best Paper Award 1 - Young Investigator´ Session	Allergy & Clinical Immunology Society (Singapore)	8th Asian Pacific Congress of Allergy Asthma and Clinical Immunology Singapore November 6-9, 2010
28.	Prof. Ashok Shah	Chaired a session on Respiratory diseases	New Delhi Tuberculosis Centre	Update on Tuberculosis and Respiratory Diseases on the occasion of 70th Foundation Day of the New Delhi Tuberculosis Centre New Delhi November 20, 2010
29.	Prof. Ashok Shah	Chaired and Judged the Free Paper Award session on COPD	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2010) Jodhpur November 26-30, 2010
30.	Prof. Ashok Shah	Chaired the plenary session on Update on asthma and lower airway co-morbidities	The World Allergy Organization	The World Allergy Organization International Scientific Conference (WISC) Dubai December 5-8, 2010
31.	Prof. Ashok Shah	Lecture on: Chronic obstructive pulmonary disease and upper airways inflammation	National College of Chest Physicians (India), Delhi Chapter	Monthly Clinical Meeting of the National College of Chest Physicians (India) India Habitat Centre New Delhi January 23, 2011

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32.	Prof. Ashok Shah	Chaired a panel session on Indoor pollutants and atopic dermatitis Attended, Editorial Board meeting of *Asia Pacific Allergy* Journal	West Pacific Allergy Organization	West Pacific Allergy Organization Jinan Forum 2011 on "Better Environment for Atopic Dermatitis" Jinan Youth Center Jinan, Korea January 27-28, 2011
33.	Prof. Ashok Shah	Lecture on: Allergic bronchopulmonary aspergillosis	V.P.C.I. University of Delhi and Institute of Genomics and Integrative Biology	36th Workshop on Respiratory Allergy: Diagnosis and Management Delhi February 7-11, 2011
34.	Prof. Ashok Shah	Chaired the plenary session on Hereditary angioedema	V.P.C.I. University of Delhi	1st Conference of South Asia Association of Allergy, Asthma and Clinical Immunology Delhi February 12-13, 2011
35.	Prof. Ashok Shah	Lectures on: • Pulmonary sarcoidosis : presentation in India • Rationale of treatment of tuberculosis • *Aspergillus* associated hypersensitivity respiratory disorder	Department of Medicine, Gauhati Medical College and Hospital	CME Guwahati March 13, 2011
36.	Prof. S.K. Chhabra	Lecture on: Arterial blood gases and pulse oximetry	Sri Ramachandra Medical College and Research Institute	Workshop on Intensive Care Chennai August 5-7, 2010
37.	Prof. S.K. Chhabra	Lecture on: Air pollution and its adverse effects	Centre for Science and Environment	Workshop on Solutions to Pollution and Mobility Crisis New Delhi September 21-22, 2010
38.	Prof. S.K. Chhabra	Lectures on: • Lung volume measurements • Body plethysmography	L.R.S. Institute of Tuberculosis and Respiratory Diseases	Workshop on Spirometry, Lung Volume, Diffusion Capacity and Body Plethysmography New Delhi October 24, 2010

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
39.	Prof. S.K. Chhabra	Lecture on: Control of bronchial asthma Practical demonstrations on Pulmonary function tests	V.P.C.I. University of Delhi and Institute of Genomics and Integrative Biology	36th Workshop on Respiratory Allergy: Diagnosis and Management Delhi February 7-11, 2011
40.	Prof. S.K. Chhabra	Practical demonstrations on Pulmonary Function Tests	V.P.C.I. University of Delhi	1st Conference of South Asia Association of Allergy, Asthma and Clinical Immunology (SAAAACI - 2011) Delhi February 12-13, 2011
41.	Prof. S.K. Bansal	Chaired a scientific session on Phytochemistry and toxicology	D.I.P.A.S.	National Conference on Seabuckthorn: Promoting Health and Promoting Environment Delhi November 26-27, 2010
42.	Prof. S.K. Bansal	Organising Secretary	ACBI, Delhi Chapter	2nd Y. Subbarow Memorial Oration Delhi February 10, 20011
43.	Prof. K. Ravi	Organising Secretary	V.P.C.I. University of Delhi	National Symposium on "Sleep Apnea: An Update" on the occasion of the 61st Foundation Day of the Vallabhbhai Patel Chest Institute Delhi April 5, 2010
44.	Prof. K. Ravi	Organising Secretary Lecture on: Obstructive sleep apnea and renal functions	V.P.C.I. University of Delhi	Workshop on "Nuts and Bolts of Sleep Laboratory" Delhi April 6, 2010
45.	Dr Raj Kumar	Organising Secretary	V.P.C.I. University of Delhi and Society for Tobacco Control	Symposium on the occasion of "World No Tobacco Day" Delhi May 31, 2010

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
46.	Prof. Raj Kumar	Organising Secretary Lectures on: • Smoking cessation • Behavioural counselling	V.P.C.I. University of Delhi and Society for Tobacco Control	Training in Behavioural Counselling: Tobacco Cessation Delhi July 22, 2010
47.	Prof. Raj Kumar	Chaired a session on Smoking and lung health	Tata Memorial Hospital	National Conference on Tobacco or Health Mumbai September 23-25, 2010
48.	Prof. Raj Kumar	Lecture on: Food allergy in bronchial asthma Practical training on skin testing	V.P.C.I. University of Delhi and Institute of Genomics and Integrative Biology	36th Workshop on Respiratory Allergy: Diagnosis and Management Delhi February 7-11, 2011
49.	Prof. Raj Kumar	Organising Secretary Chaired a session on Exhaled nitric oxide: basic aspect and clinical use	V.P.C.I. University of Delhi	1st Conference of South Asia Association of Allergy, Asthma and Clinical Immunology (SAAAACI - 2011) Delhi February 12-13, 2011
50.	Dr Malini Shariff	Organising Secretary	Dept. of Microbiology, V.P.C.I., University of Delhi and Indian Association of Medical Microbiologists (IAMM), Delhi Chapter	Workshop on "Molecular Diagnosis and Typing of Bacterial Respiratory Pathogens" on the occasion of annual conference of IAMM Delhi March 25, 2011
51.	Dr Malini Shariff	Member, Organising Committee	A.I.I.M.S.	3rd Annual Conference on "Microbial Evolution-Adaptations and Challenges" (MICRO-D-CON) New Delhi March 26, 2011

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52.	Dr Balakrishnan Menon	Presented a paper on Effect of pulmonary rehabilitation on systemic inflammation, functional parameters and muscle cross sectional area in COPD	European Respiratory Society	20th European Respiratory Society Annual Congress (ERS - 2010) Barcelona, Spain September 18-22, 2010
53.	Dr Balakrishnan Menon	Presented a paper on Effect of pulmonary rehabilitation on MMP-9 and TIMP-1 on MTCSA, and 6MWD in patients of COPD	Asia Pacific Society of Respirology (APSR)	15th Congress of Asia Pacific Society of Respirology (APSR) Manila, Philippines November 22-25, 2010
54.	Dr Balakrishnan Menon	Lecture on: Pharmacology of asthma	V.P.C.I. University of Delhi and Institute of Genomics and Integrative Biology	36th Workshop on Respiratory Allergy: Diagnosis and Management Delhi February 7-11, 2011
55.	Dr Mandira Varma	Lecture on: Computers in primer designing	Miranda House, University of Delhi	Workshop on Bioinformatics- Uraveling Genes and Proteins Delhi May 10-15, 2010
56.	Dr Mandira Varma	Lecture on: Rapid molecular diagnostic techniques	Miranda House, University of Delhi	Workshop on Rapid Medical Biotechnology Delhi September 11, 2010
57.	Dr Mandira Varma	Presented a paper on Genotypic diversity of *M. tuberculosis* isolates from patients of pulmonary tuberculosis in North Delhi region, India	International Union Against Tuberculosis and Lung Diseases	41st Union World Conference on Lung Health Berlin, Germany November 11-15, 2010
58.	Dr Mandira Varma	Invited Expert Presentation on Researh in tuberculosis	National Institute of Allergy and Infectious Diseases, National Institute of Health (USA) and University of Delhi, South Campus	Indo-US Programme on HIV STI Prevention Research, Indo-US Vaccine Action Programme, TB Scientific Review and Visit to India New Delhi December 2, 2010

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59.	Dr Anuradha Chowdhary	Presented papers on • Comparison of antifungal susceptibility profiles of clinical and environmental isolates of *Cryptococcus neoformans* var *grubii* and *Cryptococcus gattii* serotype B from north-western India • *In vitro* antifungal susceptibility of clinical isolates of *Aspergillus* spp. and other pathogenic molds´ • Seasonal variations in the prevalence of Cryptococcus *neoformans* var *grubii* and *Cryptococcus gattii* in decayed wood inside trunk hollows of diverse tree species in north-western India: a retrospective study	Indian Association of Medical Microbiologists (IAMM)	XXXIV Annual Congress of Indian Association of Medical Microbiologist Kolkata November 24-28, 2010
60.	Dr Anuradha Chowdhary	Presented a paper on *In vitro* antifungal susceptibility profiles of pathogenic molds isolated in hospitals of Delhi/ New Delhi, 2007-2010	Indian Association of Medical Microbiologists (IAMM), Delhi Chapter	XXXIV Annual Conference of Indian Association of Medical Microbiologists, Delhi Chapter G.B. Pant Hospital Delhi December 11, 2010
61.	Dr Anuradha Chowdhary	Presented a paper on *In vitro* susceptibilities of 51 clinical zygomycetes isolated in Delhi/New Delhi area	International Society for Human and Animal Mycology (ISHAM)	The Dynamics of Zygomycete Research in a Changing World. A Workshop on Zygomycete Biodiversity Utrecht, The Netherlands March 3-5, 2011

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
62.	Dr Madhu Khanna	Preseted a poster on inhibition of viral replication by down regulation of NS1 gene of influenza A virus	Centers for Disease Control and Prevention (CDC)	International Conference on Emerging Infectious Diseases Atlanta, GA, USA July 11-14, 2010
63.	Dr Madhu Khanna	Preseted a poster on Potent inhibition of novel pandemic influenza A (H1N1) by FLH and MeUH compounds	International Society fro Influenza and other Respiratory Virus Diseases	Options for the Control of Influenza VII Hong Kong SAR, China September 3-7, 2010
64.	Dr Madhu Khanna	Organising Secretary	V.P.C.I. University of Delhi	2nd Annual Conference of the International Association of Medical and Pharmaceutical Virologists Delhi March 3-5, 2011
65.	Dr Anita Kotwani	Presented activities of ISPOR-India Chapter	International Society for Pharmacoeconmcs & Outcome Research (ISPOR)	2010 ISPOR Board of Directors Open Meeting" during Annual International Conference of ISPOR Atlanta, U.S.A. May 14, 2010
66.	Dr Anita Kotwani	Presented papers on • Prescribing antibiotics for acute respiratory tract infections by primary care physicians in New Delhi, India • Need for improving access to essential medicines and treatment behavior to bronchial asthma a chronic diseases	International Society for Pharmacoeconmcs & Outcome Research (ISPOR)	Annual International Conference of ISPOR Atlanta, U.S.A. May 15-19, 2010

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
67.	Dr Anita Kotwani	Presented papers on • Antibiotic prescribing practices of primary care prescribers for diarrhea in New Delhi, India • Pharmaceutical procurement and supply chain in public and private sector in Delhi, India	International Society for Pharmacoeconomics & Outcome Research - Asia Pacific Conference, (ISPOR-AP)	International Society for Pharmacoeconomics & Outcome Research - Asia Pacific Conference, (ISPOR-AP) Phuket, Thailand September 5-7, 2010
68.	Dr Anita Kotwani	Presented the data on Antibiotic use in the community from New Delhi	N.C.D.C., Ministry of Health, G.O.I. and WHO-SEARO (South-East Asia Regional Office)	Task Force Meetings on Preparing Antibiotic Policy for the Country New Delhi October 7, 2010
69.	Dr Kavita Gulati	Presented a paper on Evaluation of the efficacy and pharmacodynamics of UNIM- 352, a polyherbal drug, in bronchial asthma: a reverse pharmacology approach	Danish Society of Pharmacology and British Pharmacology Society	16th World Congress of Basic and Clinical Pharmacology (WorldPharma 2010) Copenhagen, Denmark July 17-23, 2010
70.	Dr Kavita Gulati	Joint Secretary	V.P.C.I. University of Delhi	National Symposium on Translational Research in New Drug Development Delhi January 12-13, 2011
71.	Dr Kavita Gulati	Presented a paper on Oestrogen- nitric oxide (NO) interactions may regulate gender based differences in stress susceptibility and adaptation in rats	Elsevier and the Endocrine Society	International Congress on Steroid Research Chicago, USA March 27-29, 2011
72.	Dr Vishal Bansal	Presented a paper on Effect of pulmonary rehabilitation on markers of systemic inflammation and oxidative stress in patients with COPD	Indraprastha Association of Rehabilitation Medicine (IPARM), Delhi Chapter of Indian ssociation of Physical Medicine and Rehabilitation (IAPMR), and PGIMER & Dr Ram Manohar Lohia Hospital	39th Annual Conference & 5th Annual Conference of IPARM (Delhi Chapter of IAPMR) New Delhi February 4-6, 2011

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
73.	Dr Vishwajeet Rohil	Participated as Faculty Member	Max Healthcare Institute Ltd	National Conference on Latest Advancements In Laboratory Medicine New Delhi February 12, 2011
74.	Dr Ritu Kulshrestha	Organising Secretary Lecture on: Infectious pneumonias (Workshop on Transbronchial Lung Biopsy Interpretation) Presented papers on • Interstitial lung disease complicated by tuberculosis and lung malignancy • Combined pulmonary emphysema with interstitial pulmonary siderofibrosis	V.P.C.I. University of Delhi, Pulmonary Pathology Society of India and the Pulmonary Pathology Society, Division of American Society of Investigative Pathology	International Conference on Pathology of Environmental Lung Diseases (POED 2010) Delhi November 29-30, 2010
75.	Dr Ritu Kulshrestha	Chaired a session on Management of upper airway diseases by yoga	V.P.C.I. University of Delhi and Morarji Desai National Institute of Yoga	National Symposium and Workshop on Yogic Management of Pulmonary Diseases Delhi January 27-28, 2011
76.	Dr Ashima Jain (MD Student) *(Guide: Prof. Mridula Bose)*	Presented a poster on Diagnostic utility of real time PCR and use of IL-10 as an immunological marker in lymph node tuberculosis	A.I.I.M.S.	3rd Annual Conference on "Microbial Evolution-Evolution-Adaptations and Challenges (MICRO-D-CON) New Delhi March 26, 2011
77.	Dr Ashima Jain (MD Student) *(Guide: Prof. Mridula Bose)*	Presented a poster on Evaluation of diagnostic value of real time PCR and prognostic utility of IL-10 in lymph node tuberculosis	I.C.G.E.B.	International Symposium on Tuberculosis Diagnostics: Innovating to Make an Impact New Delhi December 16-17, 2010

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
78.	Dr Ashima Jain (MD Student) *(Guide: Prof. Mridula Bose)*	Presented a poster on Can IL-10 be the marker for lymph node tuberculosis	Indian Association of Medical Microbiologists, Delhi Chapter	Indian Association of Medical Microbiologists Delhi August 24, 2010
79.	Mr Abhimanyu (PhD Student) *(Guide: Prof. Mridula Bose)*	Presented a poster on Differential serum cytokine levels are associated with cytokine gene polymorphisms in north Indians	I.C.G.E.B.	International Symposium on Tuberculosis Diagnostics: Innovating to Make an Impact New Delhi December 16-17, 2010
80.	Mr Abhimanyu (PhD Student) *(Guide: Prof. Mridula Bose)*	Presented a poster on Genetic association study of cytokine gene polymorphisms in north Indians reveals associated risk loci for pulmonary tuberculosis	Manipal Life Sciences Centre, Manipal	Genomics, Genetic Diseases and Diagnostics" and XXXVI Annual Conference of the Indian Society of Human Genetics Manipal February 14-16, 2011
81.	Ms Amita Chandolia (PhD Student) *(Guide: Prof. Mridula Bose)*	Presented a poster on Functional analysis of mce4A(RV3499c) gene of *M. tuberculosis* H37Rv using antisense approach	I.C.G.E.B.	International Symposium on Tuberculosis Diagnostics: Innovating to Make an Impact New Delhi December 16-17, 2010
82.	Ms Kushal Grima (PhD Student) *(Guide: Prof. Mridula Bose)*	Presented a poster on PCR restriction analysis for early identification of non tuberculous mycobacteria	I.C.G.E.B.	International Symposium on Tuberculosis Diagnostics: Innovating to Make an Impact New Delhi December 16-17, 2010

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
83.	Mr Rajesh Sinha (PhD Student) *(Guide: Prof. Mridula Bose)*	Presented a poster on Choesterol uptake in *M.tuberculosis*: The role of Mce4A protein	International Union Against Tuberculosis and Lung Diseases	41st Union World Conference on Lung Health Berlin, Germany November11-15, 2010
84.	Ms Rashmi Pasricha (PhD Student) *(Guide: Prof. Mridula Bose)*	Presented a poster on Single nucleotide polymorphisms in the mammalian cell entry operons of *M. tuberculosis*	International Union Against Tuberculosis and Lung Diseases	41st Union World Conference on Lung Health Berlin, Germany November11-15, 2010

Participation in Advanced and Specialised Training Programme by Faculty Members

Sl No.	Participant (Department)	Course Title/ Topic	Training Duration	Host
1.	Dr Mujeeb-ur-Rahman (Biostatistics)	National Workshop on Computational Science	July 1-7, 2010	Swami Shraddhanand College, University of Delhi in collaboration with Department of Physics & Astrophysics, University of Delhi, Delhi
2.	Dr Vishwajeet Rohil (Clinical Biochemistry)	Tissue Culture Training	November 1-15, 2010	ESCO Biotech on Biosafety Cabinet Mumbai, India
3.	Dr Vishwajeet Rohil (Clinical Biochemistry)	Training on the Operational and Application functions on ELISA Reader with plate washer, Electrophoresis, Wide Mini Sub cell GT and Gradient PCR (Mycycler Thermal Cycler)	February1-15, 2011	Bio-Rad Laboratories (India) Pvt. Ltd Gurgaon (Haryana)
4.	Dr Vishwajeet Rohil (Clinical Biochemistry)	DNA Sequencer (Genetic Analyzer)	March 28 - April 1, 2011	Invitrogen Bioservices India Pvt. Ltd Gurgaon (Haryana)
5.	Dr Anuradha Chowdhary (Medical Mycology)	Medical Mycology	March 7-18, 2011	Centraalbureau voor Schimmelcultures (CBS), Fungal Biodiversity Centre, Institute of the Royal Netherlands Academy of Arts and Sciences (KNAW), Netherlands
6.	Prof. A. Ray (Pharmacology)	Workshop on Writing Pre-clinical Protocol & GLP Concepts	December 13-16, 2010	National Instititute of Nutrition, Hyderabad and Indian Pharmacological Society

Sl No.	Participant (Department)	Course Title/ Topic	Training Duration	Host
7.	Dr Kavita Gulati (Pharmacology)	Workshop on Writing Pre-clinical Protocol & GLP Concepts	December 13-16, 2010	National Instititute of Nutrition, Hyderabad and Indian Pharmacological Society
8.	Dr Kavita Gulati (Pharmacology)	Workshop on Molecular Techniques for Detection of Viral Infections	March 3, 2011	Indian Association of Medical and Pharmaceutical Virologists at VPCI, Delhi

Short-Term Specialised Trainings Imparted by Faculty Members

Sl No.	Name, Subject and Organisation	Course Title/Topic	Faculty Member (Department)	Period
1.	Mr Kushagra Pathak BTech (Biotechnology) Amity Institute of Biotechnology, Amity University, Noida (U.P.)	Techniques in biochemistry	Prof. S.K. Bansal (Biochemistry)	June 10- July 9, 2010
2.	Ms Pooja Singh MSc (Medical Microbiology) Combined Institute of Medical Sciences and Research, Dehradun (Uttaranchal)	Expression and Purification of mce4A protein of *M. tuberculosis*	Prof. Mridula Bose (Microbiology)	March 6 - June 6, 2010
3.	Ms Parul Mehrotra MSc (Biotechnology) Jaypee Institute of Technology, Noida (U.P.)	Expression and purification of RNA polymerase core enzyme of *Mycobacterium tuberculosis*	Prof. Mridula Bose (Microbiology)	June 24 - July 4, 2010
4.	Ms Akansha Tripathy MSc (Biotechnology) Govt. Thakur Ranmat Singh Autonomous College, Rewa (M.P.)	Expression of lspA gene of *Mycobacterium tuberculosis* in different stress conditions	Prof. Mridula Bose (Microbiology)	March 15 - June 14, 2011
5.	Ms Panchali Sudhirchander Kanvatirth MSc (Biotechnology) Amity Univerity, Noida, U.P.	Comparative study of gene expression in *M. tuberculosis* in clinical isolates of pulmonary and lymph node tuberculosis	Prof. Mridula Bose (Microbiology)	March 15 - July 7, 2011
6.	Ms Gunjan Sethi BTech (Biotechnology) Career Institute of Technology and Management, Faridabad (Haryana)	Identification of clinical and environmental isolates of *Mycobacterium* spp. by PCR restriction analysis	Dr Mandira Varma (Microbiology)	June 1 - July 31, 2010

Sl No.	Name, Subject and Organisation	Course Title/Topic	Faculty Member (Department)	Period
7.	Ms Payal BTech (Biotechnology) Galgotia Institute of Biotechnology, Noida, Uttar Pradesh	Experimental techniques in drug development	Prof. A. Ray (Pharmacology)	May - July 2010
8.	Ms Aruna BTech (Biotechnology) Manipal University, Manipal, Karnataka	Analytical techniques in pharmacology and drug research	Prof. A. Ray (Pharmacology)	June- August 2010
9.	Shukha Negi Bsc(Hons) (Biomedical Sciences) Shaheed Rajguru College of Applied Sciences for Women, Delhi	Neurotoxicological techniques	Dr Kavita Gulati (Pharmacology)	May-June 2010
10.	Neha Sharma Bsc(Hons) (Biomedical Sciences) Shaheed Rajguru College of Applied Sciences for Women, Delhi	Neuropharmacological techniques	Dr Kavita Gulati (Pharmacology)	May-June 2010
11.	Short International Training Progarmme to a group of Bangladesh Pulmonoligists from the National Institute of Diseases of the Chest & Hospital, Mohakhali, Dhaka	Topics of Respiratory Medicine including allergy (sking prick testing/ immunotherapy), bronchoscopy simulator, radiology, pulmonay funcion testing, sleep laboratory and intensive care unit management, etc	Dr V.K. Vijayan, (Respiratory Medicine), Prof. Raj Kumar (Respiratory Allergy and Applied Immunology)	January 21-28, 2011
12.	Short International Training Progarmme to Senior Registrars from the Teaching Hospital, Kandy, Sri Lanka	Topics of Respiratory Medicine including allergy (sking prick testing/immunotherapy), bronchoscopy simulator, radiology, pulmonay funcion testing, sleep laboratory and intensive care unit management, etc	Dr V.K. Vijayan, (Respiratory Medicine), Prof. Raj Kumar (Respiratory Allergy and Applied Immunology)	March 6-7, 2011

Sl No.	Name, Subject and Organisation	Course Title/Topic	Faculty Member (Department)	Period
13.	Short International Training Progarmme to a group of Bangladesh Pulmonoligists from the National Institute of Diseases of the Chest & Hospital, Mohakhali, Dhaka	Topics of Respiratory Medicine including allergy (sking prick testing/ immunotherapy), bronchoscopy simulator, radiology, pulmonay funcion testing, sleep laboratory and intensive care unit management, etc	Dr V.K. Vijayan, (Respiratory Medicine), Prof. Raj Kumar (Respiratory Allergy and Applied Immunology)	March 7-11, 2011
14.	Ms Ekta Saini BSc (Hons) (Biomedical Science) Shaheed Rajguru College of Applied Sciences for Women, Delhi	PCR amplification and cloning of NS1 gene of influenza A virus in mammalian expression vector	Dr Madhu Khanna (Respiratory Virology)	May 3- July 3, 2010
15.	Ms Ankita Singh BSc (Hons) (Biomedical Science) Shaheed Rajguru College of Applied Sciences for Women, Delhi	Determination of antiviral activity of chemically synthesized compounds in MDCK cell line	Dr Madhu Khanna (Respiratory Virology)	May 3- July 3, 2010

Institute celebrated the Independence Day function on 15th August 2010.

List of Publications

1. Anand A, Srivastava N, Raj H, Vijayan VK. Influence of codeine on lobeline-induced respiratory reflexes and sensations and on ventilation with exercise in healthy subjects. *Respir Physiol Neurobiol* 2011;175:169-75.
2. Angrup A, Varma-Basil M, Kumar S, Pathak RK, Sharma H, Banavaliker JN, Bose M. Drug resistance among *Mycobacterium tuberculosis* isolates from private clinics and a DOTS center in Delhi, India. *Southeast Asian J Trop Med Public Health* 2011;42:122-7.
3. Arora N, Kukreja N, Nair S, Gaur SN, Singh BP. Allergen immunotherapy: current approaches for management. In: Blacke C Sacinelli, Editor. *Immunotherapy: Activation, Suppression and Treatment*. Nova Science Publishers, Inc. Hanppage NY. 2010.
4. Baghel AS, Tandon R, Gupta G, Kumar A, Sharma RK, Aggarwal N, Kathuria A, Saini NK, Bose M, Prasad AK, Sharma SK, Nath M, Parmar VS, Raj HG. Characterization of protein acyltransferase function of recombinant purified GlnA1 from Mycobacterium tuberculosis: A moon lighting property. *Microbial Res* 2011; March 14. [Epub ahead of print] (doi:10.1016/jmicres.2011.02.00).
5. Bansal V. Pulmonary rehabilitation: a new hope for chronic obstructive pulmonary diseases patients. *Al Ameen J Med Sci* 2011;4: 98-9.
6. 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;XX(X): 1-7.
7. Chakraborti A, Gulati K, Ray A. Involvement of nitric oxide in the protective effects of dehydroepiandrosterone sulphate onstress induced neurobehavioral suppression and brain oxidative injury in rats. *Eur J Pharmacol* 2011; 652:55-9.
8. Chhabra SK, Anand Ashima. Mechanisms of dyspnoea in respiratory diseases. In: Jindal SK, Editor-in-Chief. *Textbook of Pulmonary and Critical Care Medicine*. Jaypee Brothers Medical Publishers (P) Ltd., New Delhi. 2010; 93-106.
9. Chhabra SK, Gupta M. Coexistent chronic obstructive pulmonary disease-heart failure: mechanisms, diagnostic and therapeutic dilemmas. *Indian J Chest Dis Allied Sci* 2010;52: 225-38.
10. Chhabra SK, Gupta Mansi. Respiratory physiology in specific physiological states. In: Jindal SK, Editor-in-Chief. *Textbook of Pulmonary and Critical Care Medicine*. Jaypee Brothers Medical Publishers (P) Ltd., New Delhi. 2010; 81-92.
11. Chhabra SK, Abdul Yasir, Chaudhry K, Shah B. Potentiation of allergic asthma by exposure to Ozone and its modulation by dietary antioxidants, alpha tocopherol and ascorbic acid. *Indian J Med Res* 2010;132:87-93.
12. Chhabra SK, Gupta M. Confirmation of asthma diagnosis in the community. *Eur Respir J* 2011;37:222-3.
13. Chhabra SK, Gupta Mansi. Normal respiratory physiology. In: Behera D, Editor-in-Chief. *NCCP Textbook of Respiratory Medicine*. Jaypee Brothers Medical Publishers (P) Ltd., New Delhi. 2011;43-67.
14. Chowdhary A, Randhawa HS, Khan ZU, Ahmad S, Khanna G, Gupta R, Chakravarty A, Roy P. Rhinoentomophthoromycosis due to *Conidiobolus coronatus* - A case report and an overview of the disease in India. *Medical Mycology* 2010;48: 870-9.
15. Chowdhary A, Randhawa HS, Kowshik T, Kathuria S, Roy P, Brandt ME. Application of hypertonic Sabouraud glucose agar for differentiation of *Candida dubliniensis* from *Candida albicans*. *Diagn Microbiol Infect Dis* 2010;4:440-2**.**
16. 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* March 10, 2010. PMID: 21393452 (Epub ahead of print).

17. 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 pediatric patient. *Med Mycol* March 14, 2011. PMID: 21395476 (Epub ahead of print).

18. Gaur SN. Associate Editor, Behera D, Editor-in-Chief. *NCCP Text Book of Respiratory Medicine*, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi, First Edition, 2011.

19. Gaur SN. Allergy and allergen specific immunotherapy In: Behera D, Editor-in-Chief. *NCCP) Textbook of Respiratory Medicine*. Jaypee Brothers Medical Publishers (P) Ltd., New Delhi, First Edition, 2011, Pp. 546-68.

20. Gaur SN. Hypersensitivity pneumonitis. In: Behera D, Editor-in-Chief. *NCCP Textbook of Respiratory Medicine*. Jaypee Brothers Medical Publishers (P) Ltd., New Delhi, First Edition, 2011, Pp. 845-52.

21. Gaur SN. Respiratory allergy: basic mechanism, clinical presentation and allergen specific immunotherapy. In: Srivastava UC and Kumar Santosh, Editors. *Emerging Trends in Zoology*, Narendra Publishing House, New Delhi, 2011, Pp. 227-56.

22. Gaur SN, Tyagi P. Anaerobic pleuropulmonary infections. In: Behera D, Editor-in-Chief. *NCCP Text Book of Respiratory Medicine*, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi, First Edition, 2011, Pp. 140-3.

23. Gopal B, Gaur SN. Gastroesophageal reflus. In: Behera D, Editor-in-Chief. *NCCP Textbook of Respiratory Medicine*. Jaypee Brothers Medical Publishers (P) Ltd., New Delhi, First Edition, 2011, Pp. 577-84.

24. Gulati Kavita, Ray A. Newer insights into the mechanisms of action of some herbal adaptogens. In: Ray A, Gulati Kavita, Editors. *Recent Advances in Herbal Drug Research and Therapy*. I.K. International, New Delhi, 2010, 201-18.

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27. Gulati Kavita, Chakraborty A, Ray A. Physiological and behavioral correlates of stress induced anxiogenesis in rats: possible role of free radicals. *Indian J Pharmacol* 2011;42 (Suppl.2):128-9.

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30. Gupta S, Sharma SB, Singh UR, Bansal SK, Prabhu KM. Elucidation of mechanism of action of Cassia auriculata leaf extract for its antidiabetic activity in streptozotocin-induced diabetic rats. *J Med Food* 2010;13:528-34.

31. Holloway K, Mathai E, Gray A, on behalf of Community-based surveillance of antimicrobial use and resistance in resource-constrained settings Project Group (Kotwani A, *et al*). Surveillance of community antimicrobial resistance in resource-constrained settings – experience from five pilot projects. *Trop Med Int Health* 2011; 16: 368-374.

32. Holloway K, Mathai E, Gray A, on behalf of Community-based surveillance of antimicrobial use and resistance in resource-constrained settings Project Group (Kotwani A, *et a*l). Surveillance of community antimicrobial use in resource-constrained settings – experience from five pilot projects. *Trop Med Int Health* 2011; 16: 152-61.

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34. Khanna M, Rajput R, Kumar P, Sharma D, Mathur D, Prasad AK. Potent inhibition of pandemic influenza H1N1 (2009) virus propagation by novel chemically synthesized compounds. *Influenza and Other Respiratory Viruses* 2010;5 (suppl 1): 90-123.

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