ANNUAL REPORT
2008-09

Vallabhbhai Patel Chest Institute
University of Delhi, Delhi, India

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From the Director's Desk

The Vallabhbhai Patel Chest Institute founded in 1949 has entered in its 60th year of establishment. The Institute was started as a postgraduate medical Institute with the main aims of postgraduate medical education, research and patient care activities. The Institute, funded by the Ministry of Health & Family Welfare, Government of India and maintained by the University of Delhi, has discharged its activities with national and international recognition. A series of educational activities were organized by the Institute in 2008-09 as part of its Diamond Jubilee Celebrations and notable among these was the organization of an "International Conference on Pathology of Chest Diseases: An Integrated Approach" from 6th-7th December 2008 and this conference was Co-sponsored by the Pulmonary Pathology Society, Division of United States and Canadian Academy of Pathology. A new Society "Pulmonary Pathology Society of India" was founded on this occasion and we do hope that this Society will play a significant role in the development of pulmonary pathology in India. Prof. C.R. Babu, former Pro-Vice-Chancellor, University of Delhi, delivered the 10th "Prof. Raman Viswanathan – VPCI Oration" on 6th April 2008 on the occasion of the 59th Foundation Day Celebration. A National Seminar on "Yogic Management of Cardio-respiratory Diseases" was also organized on this occasion on 5th and 6th April 2008 in collaboration with the Morarji Desai National Institute of Yoga (MDNIY), New Delhi.

Dr Nanduri R. Prabhakar, University of Chicago, USA delivered the 4th "Prof. Autar Singh Paintal Memorial Oration" on 24th September 2008. The 8th CME on "Diagnostic Bronchology" was held on 29th June 2008 and a Workshop on "Smoking Cessation" was organized on 15th October 2008. A National Seminar on "Emerging Trends in Nitric Oxide Research: Impact on Health, Disease and Drug Development" was conducted on 12th January 2009. The 34th Workshop on "Respiratory Allergy Diagnosis and Management" was organized by VPCI in collaboration with the Institute of Genomics and Integrative Biology, Delhi, from 16th-19th February 2009.

The Institute is engaged in postgraduate medical education by conducting MD courses on Pulmonary Medicine, Biochemistry, Physiology, Microbiology and Pharmacology, PhD programme in subjects related to chest medicine and allied sciences and a diploma course in chest diseases. A large number of students from other institutions / colleges were also trained in the departments of the Institute. The faculty members were engaged in many research projects sponsored by different agencies of Government of India, World Health Organization, etc. Research findings from these studies are presented by students and faculty members of the Institute in national and international conferences and are published in national and international journals of repute.

The Viswanathan Chest Hospital attached to the Institute has provided the state-of- the-art diagnostic and treatment services including critical care management to the patients suffering from respiratory and allied diseases. This is reflected in the increasing numbers of patients attending the Institute and also the increasing numbers of patients admitted to the Intensive Care Unit with better survival rates. The Cardio-Pulmonary Rehabilitation Clinic in the Viswanathan Chest Hospital is a boon to many respiratory cripples who are now surviving with better quality of life.

Dr V.K. Vijayan

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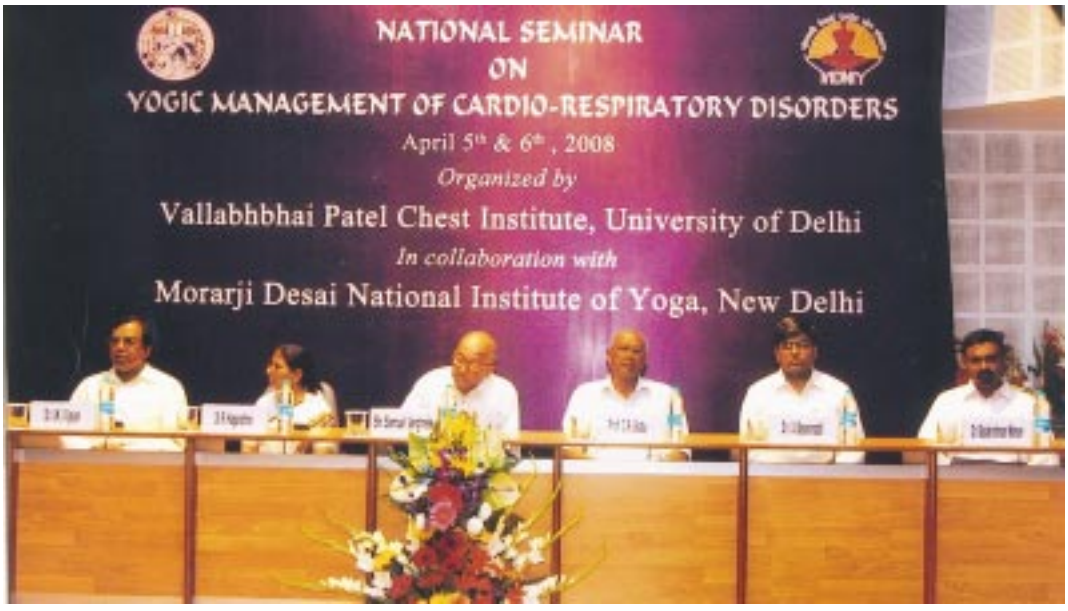
MILESTONES OF VPCI

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.
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 Dr Nanduri R. Prabhakar, Director Center for System Biology of Oxygen Sensing, Department of Medicine, University of Chicago, Chicago, U.S.A.



"National Seminar on Yogic Management of Cardio-Respiratory Disorders" held on 5th-6th April 2008. *Dignitaries on the dais (left to right)*: Dr V.K. Vijayan (Director, VPCI); Dr R. Nagarathna, Dean, Swami Vivekanand Yoga Research Foundation, Bengaluru; Shri Samuel Verghese, Joint Secretary, Ministry of Health & Family Welfare, Government of India, New Delhi; Prof. C.R. Babu, Emeritus-Professor & former Pro-Vice-Chancellor, University of Delhi, Delhi; Dr I.V. Basavaraddi, Director, M.D.N.I.Y., New Delhi & Co-Chairman of the Seminar; Dr Balakrishnan Menon, Organising Secretary of the Seminar.

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 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. N.K. Ganguly** Former Director-General, ICMR, New Delhi
MEMBERS	
Treasurer, University of Delhi (Ex-Officio)	**Mrs Janaki Kathpalia**
Two members nominated by the Executive Council, University of Delhi	**Prof. Rup Lal** *(25.01.2008 onwards)* **Prof. Anil Tyagi** *(22.08.2008 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** Additional Secretary and Financial Advisor **Smt. Shalini Prasad** 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. S.N. Gaur** *(till 02.11.2008)* **Prof. Raj Kumar** *(03.11.2008 onwards)*
One Associate Professor or Assistant Professor of the Institute by rotation according to seniority for a period of one year	**Dr B. Menon** *(till 02.11.2008)* **Dr Malini Shariff** *(03.11.2008 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*
Additional 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

Member

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

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

Deputy Registrar — *Member*
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
Nirman Bhawan
New Delhi

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

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

Prof. Raj Kumar — *Member*
Head, Department of Respiratory Allergy and
Applied Immunology
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 and GB Pant Hospitals
B.L. Taneja Block, 1st Floor
New Delhi-110 002

Prof. S. Dwivedi — *Member*
Head, Department of Medicine / Preventive Cardiology
University College of Medical Sciences (UCMS)
Shahdara
Delhi-110 095

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 Mandira Varma — *Member*
Associate Professor, Department of Microbiology
V.P. Chest Institute
University of Delhi, Delhi

Prof. Anita Kotwani — *Member*
Associate Professor, Department of Pharmacology
V.P. Chest Institute
University of Delhi, Delhi

Dr Rameshwar Singh — *Member*
Veterinary Surgeon (Retd) - DIPAS
DG-II / 199-D, Vikaspuri
New Delhi -110 018

Ms Geeta Seshamani — *Nominee of CPCSEA*
President
Friendicoes -SECA, Shop Nos. 271 & 273
Defence Colony Flyover Market (Jangpura Side)
New Delhi - 110 024

Prof. K. Muralidhar — *Nominee of CPCSEA*
Department of Zoology
University of Delhi, Delhi

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

Mrs Uma Tyagi — *Member*
Librarian
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

S.S. Thukral, MSc (Hons), PhD
Professor (on E.O.L. up to 10.07.2010)

(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, MSc, PhD
Associate Professor

(Mrs) Kavita Gulati, MSc, PhD
Reader

Physiology

K. Ravi, MSc, PhD
Professor

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

M. Fahim, MSc, PhD, Av HF (Germany), FAMS
Re-employed Professor (up to 23.03.2009)

Respiratory Allergy and Applied Immunology

Raj Kumar, MBBS, MD, FNCCP (I), FCAI, MIAOH
Professor (w.e.f. 30.07.2008)

Balakrishnan Menon, MBBS, DMRD, MD
Associate Professor

M.K. Agarwal, MSc, PhD, FCAI
Re-employed 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

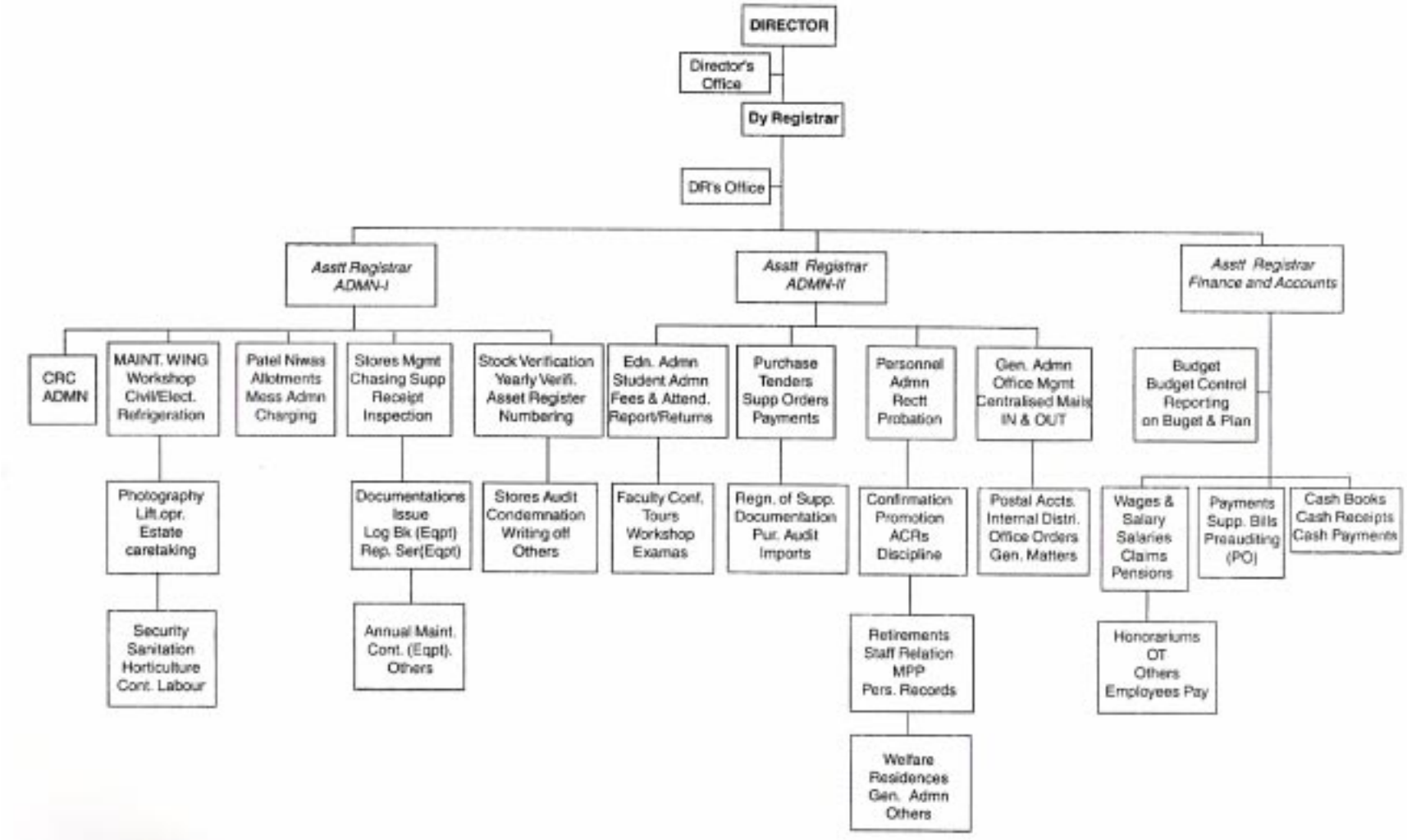
Animal House

Rajinder Bajaj, BVSc & AH
Veterinarian

Administration

Binod Kumar Singh, MA (Publ. Admn), MA (Eng.), PGDPM, LLB, PhD
Deputy Registrar (up to 06.09.2008)

ADMINISTRATIVE STRUCTURE



CENTRAL FACILITIES

Viswanathan Chest Hospital

The Viswanathan Chest Hospital (VCH), (formerly known as Clinical Research Centre), 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. Outpatient Department,
6. Inpatient Facility with 60 beds,
7. 24 Hours Respiratory Emergency,
8. 8 bedded Respiratory Intensive Care Unit (with facilities of 7ventilators),
9. Sleep Laboratory,
10. Tobacco Cessation Clinic,
11. National Yoga Therapy Centre,
12. Cardio-Pulmonary Rehabilitation Clinic,
13. Picture Archiving and Communication Systems (PACS),
14. Medical Records Section,
15. Oxygen Plant.

During the year 2008-09, 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	:	10355
Number of visits of old patients to OPD	:	48854
Total		**59209**

Total number of indoor patients

General Wards	:	2016
Emergency Wards	:	1524
Total		**3540**

Emergency treatment provided	:	19201
Total number of patients treated in ICU	:	290
Invasive ventilation	:	40
Non-invasive ventilation	:	250

Number of specialised investigations done

Pulmonary function tests	:	21707
Arterial blood gases	:	2021
Bronchoscopy	:	178
Bronchoalveolar lavage	:	20
CT scans	:	2287
Ultrasound examinations	:	401
X-rays	:	19449

Electrocardiogram	:	5045
Polysomnograms	:	77
HIV testing	:	148
Serum IgE test	:	369
Skin tests	:	571
HBsAg test	:	02
Flowcytometry	:	95
Clinical Biochemistry	:	18056

Tobacco Cessation Clinic

A Tobacco Cessation Clinic has been running on every Monday and Wednesday from 2:30 P.M.– 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 Services at Viswanathan Chest Hospital, is involved in the management of respiratory patients (Outdoor and Indoor) with disability in activities of daily living (ADL) due to shortness of breath (SOB). These patients are enrolled for rehabilitation programme where they undergo assessment for their functional capacity and oxygen requirement and further management. The program consists of two phases: *Intensive phase* and *Maintenance phase*.

In the Intensive Phase, patients undergo 80-100 minutes of individualised supervised training sessions, five days a week, for a total of 6-8 weeks. Training sessions include Breathing exercises, Bronchial secretion drainage, Endurance / Interval walk, Stairs practice, Arm and cycle ergometery and strength training with exercise intensity set according to symptom limitation. Patients also attend educational sessions on topics such as breathing exercises, energy conservation, lung health, medications and stress management.

Once the patients complete the Intensive phase, they are discharged from the programme and advised Home Programme. Patients are also advised to enroll in the Maintenance phase, where they are required to attend supervised training sessions once or twice a week. Rest of the days, they continue their home programme.

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

During the year 2008-09; 1891 patients (Outdoor and Indoor) were attended to the Cardio-Pulmonary Rehabilitation services and were explained Breathing exercises, Bronchial secretion drainage techniques and various strength exercises. Out of these, 24 patients completed the Intensive phase of supervised rehabilitation programme and out of these 24 patients, 8 patients are continuing in the maintenance phase.

The Cardio-Pulmonary Rehabilitation Clinic runs on every Tuesday and Friday from 2:00 P.M. – 4:00 P.M.

Animal House

To obtain authentic results of the research experiments and test it is important to have standardised animal with known health and genetic status. The Animal House of the Institute provide optimum environment for experimental animals and meets the international standards.

Thus, the aim of defining laboratory animals is to produce standardised animals which, in experiments will give reproducible results.

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 9,872 Books, 19,371 bound Journals, 120 CD's, 451 Thesis and 95 National and International Reports. A total of 96 Journals (91 International and 05 National) are being subscribed by the library, 20 Journals (08 International and 12 National) are being received on exchange programme with the Institute's Journal and 33 Journals (09 International and 24 National) are received on complimentary basis. Library is also subscribing four 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 Delhi University from Monday to Friday [8:30 A.M. to.7:00 P.M.].

PUBLICATION DIVISION

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

V.P. Chest Institute's site:	**:**	**http://www.vpci.org.in**
Indmed's site	**:**	**http://medind.nic.in**

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

Release of CDs on Smoking Cessation at the "Workshop on Smoking Cessation" held on 15th October 2008.

DEPARTMENTAL ACTIVITIES

Biochemistry

Research

1. Characterisation of protein acyltransferase function of purified calreticulin

We have earlier reported that an endoplasmic reticulum luminal protein calreticulin (CR) mediated the acetylation of certain receptor proteins such as glutathione S-transferase by polyphenolic acetates, leading to irreversible inhibition. This function of calreticulin was termed calreticulin transacetylase. In this study, we have demonstrated for the first time the ability of the purified recombinant calreticulin of a parasitic nematode *Haemonchus contortus* to transfer propionyl group from 7, 8-dipropoxy-4-methylcoumarin (DPMC) to recombinant *Schistosoma japonicum* glutathione S-transferase (rGST). Calreticulin transacetylase exhibited hyperbolic kinetics and yielded Km (140 μM) and Vmax (105 units) when the concentration of DPMC was varied keeping the concentration of rGST constant. rGST, thus, propionylated was found to positively interact with anti-acetyl lysine antibody. Also, the nanoscale LC-MS / MS analysis identified the propionylation sites on four lysine residues: Lys-11, -87, -180 and -181 of rGST. These results highlight the transacylase function of calreticulin (CRTAase).

2. Identification of *Starkeyomyces koorchalomoides* dihydrolipoamide dehydrogenase as a moonlighting protein

In this study, we have identified for the first time a transacetylase (TAase) in a mesophilic fungi *Starkeyomyces koorchalomoides* catalysing the transfer of acetyl group from polyphenolic acetate (PA) to a receptor protein glutathione S-transferase (GST). An elegant assay procedure was established for TAase based on its ability to mediate inhibition of GST by 7, 8-diacetoxy-4-methylcoumarin (DAMC), a model PA. Utilising this assay procedure, *S. koorchalomoides* TAase was purified to homogeneity. TAase was found to have MW of 50 kDa. The purified enzyme exhibited maximum activity at 45 ºC at pH 6.8. The N-terminal sequence of purified fungal TAase (ANDASTVED) showed identity with corresponding N-terminal sequence of dihydrolipoamide dehydrogenase (LADH), a mitochondrial matrix enzyme and an E3 component of pyruvate dehydrogenase complex (PDHC). TAase was found to have all the properties of LADH and avidly interacted with the anti-LADH antibody. TAase catalysed acetylation of GST by DAMC was identified by LC-MS / MS and a single lysine residue (Lys-113) was found to be acetylated. Further, recombinant LADH from *Streptococcus pneumoniae* lacking lipoyl domain was found to exhibit little TAase activity, suggesting the role of lipoyl domain in the TAase activity of LADH. These observations bear evidence for the protein acetyltransferase activity of LADH. This diverse function of LADH is attributable to the moonlighting property of this protein in *S. koorchalomiodes*.

3. Studies on the activation of nitric oxide synthase by acetoxy derivatives of 3-alkyl-4-methylcoumarin: role of calreticulin transacetylase

Calreticulin transacetylase (CRTAase) catalyses the transfer of acetyl groups from acetylated polyphenols (PAs) to the receptor proteins and modulates their biological activities. CRTAase was conveniently assayed by the irreversible inhibition of cytosolic glutathione S-transferase (GST) by the model acetoxycoumarin, 7, 8-diacetoxy-4-methylcoumarin (DAMC). We have studied earlier, the influence of acetoxy groups on the benzenoid ring, the effect of reduction of double bond at C-3 and C-4 position, the effect of methyl / phenyl group at C-4, and the influence of position of carbonyl group with respect to oxygen heteroatom in the benzopyran nucleus, for the catalytic activity of CRTAase. In this study, we have extended our previous work; wherein we studied the influence of an alkyl group (ethyl, hexyl and decyl) at the C-3 position of the acetoxy coumarins on the CRTAase activity. The substitution at C-3 position of coumarin nucleus resulted in the reduction of CRTAase activity and related effects. Accordingly, the formation of NO in platelets by C-3 alkyl substituted acetoxy coumarins was found to be much less compared to the unsubstituted analogs. In addition, the alkyl substitution at C-3 position exhibited the tendency to form radicals other than NO.

4. Lipid rafts in bronchial asthma: a study on membrane lipid metabolism in asthmatic patients using erythrocyte membrane as the model

Lipid rafts are small platforms, present in the exoplasmic leaflet of plasma membrane, composed of sphingolipids and cholesterol. Changes in their lipid composition may lead to the changes in the orientation of the cell surface receptors, signal transduction mechanism, cell functions, etc., leading to pathophysiology and disease manifestation. Our earlier studies had shown that in asthmatics, there was an increase in sphingomyelin (Sph) and decrease in phosphatidyl choline (PC) contents, which were of interest because of their role in maintaining the composition of lipid rafts and the membrane fluidity. We continued the study and evaluated the changes in the activity of sphingomyelinase and phospholipase A_2 enzymes which were involved in the metabolism of Sph and PC. The results showed that in asthmatics there was a significant ($P<0.001$) increase in sphingomyelinase and phospholipase A_2 activity as compared to the healthy controls.

Increase in sphingomyelin contents associated with increased sphingomyelinase activity, shows an imbalance in sphingomyelin metabolism directed towards its accumulation in asthma. The ratio of sphingomyelin to cholesterol, which is critical for maintenance of lipid rafts, was significantly higher in asthmatics. This precisely indicates changes in structure of lipid rafts, leading to changes in cell response to the triggers, the pathophysiology and ultimately development of asthma. Regulation of sphingomyelin metabolism may help in disease regulation and control. However, the increase in phospholipase A_2 activity may be the reason for the decreased contents of the PC in the membranes of erythrocytes in asthma, which may lead to its altered fluidity, integrity and response to the external stimuli *viz.* asthmogens causing precipitation of symptoms in their presence.

5. Experimental asthma: a study on transmembrane signalling in airway smooth muscles and peripheral blood lymphocytes during the development of airway hypersensitivity in guinea pig

In ovalbumin sensitised animals, in our earlier studies we observed that the onset of the airway and dermal hypersensitivity takes place on day 9th, which was optimally present on day 14th as compared to the controls. The studies were continued and we observed that on the day of initiation of the hypersensitivity (*i.e.* day 9th after sensitisation), the PKC activity significantly increased in airway smooth muscles (ASM, $P< 0.001$) and lymphocytes ($P<0.05$), as compared to the control group, which was associated with grade 1, peribronchiolar chronic lymphocytic inflammation in the lung in the sensitised group. On day-14, the PKC activity increased significantly in ASM ($P<0.001$) and lymphocytes ($P<0.01$) again in experimental group as compared to the control. In experimental group, there was grade 2 peribronchiolar infiltration of lymphocytes and eosinophils with accompanying mild increase in thickness of the subepithelial lamina reticularis in lung, suggesting that the development of inflammation in lungs in allergic asthma may be associated with changes in PKC activity.

6. ATP-binding cassette transporter (*ABCD1*) gene polymorphism in adrenoleukodystrophy

In our earlier studies on adrenoleukodystrophy on *ABCD1* gene, we reported a novel mutations in 3' splice site (intervening sequence 4 [IVS4] -2a>g) besides some other recurrent mutations. In our further studies in Indian population, for the first time, we found six additional novel mutations in *ABCD1* gene, of which, four were missense mutations and two were inframe insertion / deletion mutations. The missense mutations were one each in exon 7 at position1673T>C (Ile558Thr), exon 8 at position 1849C>A (Arg617Ser), exon 9 at position 1979G>A (Arg660Gln), and exon 10 at position 2201C>T (Pro734Leu). Of the two inframe insertion / deletion mutations, one was in exon 9 at position 1903_04insCCA (Val635delinsAlaMet) and another was in exon 10 at position 1993_95delinsGAG (Asn665delinsGln). Besides these novel mutations, we observed more recurrent mutations in *ABCD1* gene but no genotype-phenotype correlation could be established. No mutation was observed in *ABCD2* gene which indicates that it is not acting as a genetic modifier for various phenotypes of adrenoleukodystrophy in Indian population. The very long chain fatty acids (VLCFAs) levels were found to be increased more in cerebral phenotypes than non-cerebral phenotypes.

Our studies suggest that in our population, every patient of X-ALD has one mutation each in *ABCD1* gene. There is no mutation in the *ABCD2* gene. A correlation between phenotype and genotype could not be established. The VLCFA levels are significantly raised in all the symptomatic patients.

7. Studies on the role of lipids of lipid rafts of erythrocyte membrane in COPD patients

These studies were done in COPD patients to understand the changes in membrane lipids in this disease similar to those being done by us on asthma, since there are many overlaps with respect to airway inflammation and bronchial hyper reactivity in the two diseases. The study was conducted on the plasma membrane preparation of erythrocytes of COPD patients of stage II, III and IV. Patients of stage I were not included in the study. The findings were compared with the healthy non-smokers and smokers.

The results revealed that the membrane proteins decreased in stage IV COPD patients ($P<0.05$). The membrane cholesterol increased significantly ($P<0.001$) in stage IV COPD and in healthy smokers. The increase in cholesterol in COPD may be due to smoking, which is known to cause hypercholesterolemia in smokers. The total membrane phospholipid contents increased in stage IV COPD patients ($P<0.01$). The phosphatidyl choline ($P<0.01$) and phosphatidyl ethanolamine ($P<0.01$) also increased in stage IV COPD patients. All the other phospholipids remained unchanged. The fatty acid analysis of individual phospholipids showed preponderance of saturated fatty acids in COPD patients and healthy smokers. The levels of palmitic acid (C16:00) increased in all stages of COPD in every constituent phospholipid. The unsaturated fatty acids *viz.* oleic acid (C18:01) decreased in all the patient groups, while, interestingly, linoleic acid (C18:02) was substantially not present in healthy smokers or COPD patients though it was present in healthy non-smokers. The other saturated fatty acids *viz.* arachidic acid (C20:00) and behenic acid (C22:00) appeared in all the groups of COPD patients and healthy smokers while it was altogether absent in healthy non-smokers. There was a significant correlation between FEV_1% and cholesterol ($P<0.0016$), and between FEV_1% and total membrane phospholipids ($P=0.0283$) in COPD patients.

These findings suggest that in COPD patients, the membrane fluidity is decreased which may tightly pack the lipid rafts and thus, may restrict their movements, association, coalescence together in the membrane, as well as movement of their functional units for transferring the initial signal to ultimate enzymes. The significant correlation of FEV_1% with cholesterol or total membrane phospholipids suggests that with airway obstruction in COPD, these lipids increase or vice versa.

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

The objectives of the study are to study pulmonary function in schoolgoing children and develop regression equations for predicting spirometric variables in children residing in Delhi. These equations will be extremely useful in diagnosis of lung function impairment in different chest diseases. At present, most of the equipments have equations based on western population data that can lead to erroneous conclusions at times because of ethnic differences. So far, data of nearly 450 children has been collected. The data analysis is being carried out.

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

A multicentric study of lung function parameters in normal adult subjects has been approved by the Indian Council of Medical Research. The objectives are to study pulmonary function in normal healthy adults and develop regression equations for predicting spirometric variables**,** static lung volumes and single breath diffusion capacity for four regions in India: North (Delhi), South (Bangalore), East (Kolkata) and West (Mumbai). The national coordinating center is at the Institute. After screening by chest radiograph and physical examination, spirometry, static lung volume measurements and diffusing capacity measurements are being carried out. So far, data on 75 adults has been collected.

3. Comparative evaluation of quality of life, dyspnoea and lung function abnormalities in asthma and chronic obstructive pulmonary disease

Asthma and chronic obstructive pulmonary disease (COPD) are common diseases of the airways resembling in clinical features. However, the natural course of the two diseases and their impact on a patient's functional capacity are different. There was scant information on the comparative assessment of quality of life, dyspnoea and exercise tolerance in patients of COPD and asthma matched for airways function. Our study shows that patients with COPD have a poorer quality of life, greater limitation of their functional capacity, have a greater perception of dyspnoea and have a poorer exercise tolerance compared to asthmatics with similar degree of airways obstruction.

4. Heart rate variability in chronic obstructive pulmonary disease: association with systemic inflammation

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. Autonomic dysfunction is linked to cardiovascular mortality, including the risk of malignant arrhythmias and sudden cardiac death in several conditions. There is conflicting evidence in literature on autonomic dysfunction in COPD. A study is going on to study the phenomenon of heart rate variability in patients with COPD and relate it to severity of disease. So far, 12 patients have been studied. 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. It will further strengthen the concept that COPD has significant extrapulmonary component and also provide a basis for additional therapeutic options.

5. Autonomic modulation in asthma

Autonomic nervous system changes may play a role in determining the severity of asthma. Further, drugs used in the treatment of asthma also affect the parasympathetic-sympathetic balance. A study was carried out to investigate the autonomic modulation by measuring parameters of heart rate variability in patients with different degree of severity of asthma. This was followed by study of effect of inhalation of salbutamol. It was observed that patients with asthma have a parasympathetic dominance that increases with increase in severity of asthma. Inhalation of salbutamol shifts the balance towards sympathetic. These observations are of clinical relevance as these provide a basis for greater use of anticholinergic drugs in asthma and also throw light on the possible mechanisms for the increased mortality reported with excessive use of beta-adrenergic drugs.

Medical Mycology

Research

1. First isolations in India of *Candida nivariensis*, a globally emerging opportunistic pathogen

The incidence of invasive fungal infections has been rising in recent decades, especially among the immunocompromised patients, with a mortality rate as high as 40% for candidemia. More than 17 species of *Candida* have been reported as etiologic agents of invasive candidiasis in humans. Species such as *C. glabrata*, *C. lusitaniae* and *C. krusei* are generally more resistant to antifungal agents than *C. albicans*. Therefore, a rapid and accurate species identification is often critical in ensuring early and effective antifungal therapy. Two commercial methods for yeast identification, the API and VITEK systems require only 2 to 3 days for reading the results but their databases are limited. Therefore, species identification of a number of pathogenic yeast species that are difficult to identify by phenotypic methods requires the application of molecular methods. One such yeast- like pathogen is *Candida nivariensis* which has been recently demarcated from its closely related taxa, *Candida bracarensis* and *Candida glabrata*. Currently, the available assimilation tests in the API database are not helpful for identification of *C. nivariensis.* Following its first isolations in 2005 from three patients in a single Spanish hospital over a 3-year period, solitary reports have appeared on isolation of *C. nivariensis* from Japan, Indonesia, United Kingdom and Australia. We randomly screened 363 yeast isolates for development of white colonies on CHROM agar Candida medium during 2008. Two of these isolates (0.5%) were identified as *Candida nivariensis* based on their detailed phenotypic characterisation and DNA sequencing. One came from sputum of an HIV-positive patient with a pneumonic lesion and the second from the blood of a diabetic with oropharyngeal lesions. Direct DNA sequencing of the D1 / D2 region of 28S rRNA gene and / or the internal transcribed spacer (ITS) regions of rDNA confirmed that both of the isolates were *C. nivariensis.* The carbohydrate assimilation profiles with the ID 32 C and VITEK 2 yeast identification systems revealed only glucose assimilation. *In vitro* antifungal susceptibility profiles by broth microdilution and Etest methods revealed susceptibility of both isolates to fluconazole, itraconazole, voriconazole, amphotericin B and 5-flucytosine, with low MICs for posaconazole and caspofungin. The results document the occurrence of *Candida nivariensis* for the first time in India and focus on its potential as an opportunistic human pathogen.

2. Study of systemic mycoses in HIV-positive patients in a New Delhi hospital and their antifungal susceptibility pattern

A study of species spectrum of fungi causing systemic mycoses in HIV patients registered in Smt. Sucheta Kriplani Hospital, an affiliate of Lady Harding Medical College, New Delhi, was undertaken to determine the type and prevalence of systemic mycoses in HIV patients and their antifungal susceptibility pattern. The investigations included 128 clinical specimens such as sputa, CSF, blood, tissue biopsies, aspirates from lymph nodes, bone marrow, BAL, urine, etc., collected from 50 HIV-positive patients. The specimens were homogenized 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 ^{0}C and examined periodically. Species identification of the yeast isolates was done, based on morphological characters seen on various 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. Also, levels of (1→3)–β-D glucan and galactomannan in sera samples were detected using commercially available kits. Based on mycological and immunodiagnostic investigations, 31 cases of mycoses were diagnosed which gave prevalence of 62%. This included 26 cases of cryptococcosis, two each of invasive aspergillosis and oropharyngeal candidiasis and a solitary case of pneumonia with signs of systemic infection due to *Candida nivariensis*. Altogether, 133 fungal isolates (80 yeast-like and 53 filamentous) were obtained in pure culture for detailed study. Of the 80 yeast-like fungi, 37 were identified as *Cryptococcus neoformans,* 35 as *Candida albicans*, five as *Candida tropicalis* and three as *Candida nivariensis.* In the filamentous category 19 were classified as *Aspergillus niger,* 11 each as *A. fumigatus* and *A.*

flavus and two each as *Aspergillus clavatus* and *Aspergillus nidulans*. The remaining eight filamentous isolates belonged to miscellaneous genera like *Penicillium, Bipolaris, Rhizopus, Fusarium* and *Curvularia*. Antifungal susceptibility testing revealed that all of the 37 isolates of *Cryptococcus neoformans* tested showed low MIC ranges for amphotericin B (0.25-1 µg / ml) and azoles *i.e.*, 0.5-16 µg / ml for fluconazole, 0.03-1 µg / ml for itraconazole and 0.015-0.125 µg / ml for voriconazole. Except for a solitary isolate of *Cryptococcus neoformans* which had MIC-32 µg / ml, none was found resistant to 5-flucytosine. These results indicated that antifungal drug resistance in our isolates of *Cryptococcus neoformans* was of little concern.

Candida albicans was the second commonest yeast-like pathogen found in the study. Antifungal susceptibility testing of the 18 *Candida* isolates revealed that four *C. albicans* isolates originating from respiratory tract of three patients had high MIC's for azoles, *i.e.*, fluconazole (≥64 µg / ml), itraconazole (≥1 µg / ml) and voriconazole (≥4 µg / ml). One of these patients had been receiving antifungal prophylaxis but the other two isolates recovered from the sputum and BAL of two HIV-positive patients with respiratory symptoms gave no history of fluconazole prophylaxis in the past. It may be pointed out that fluconazole prophylaxis or maintainence therapy, drug interactions due to complex medical regimens and suboptimal dose therapy in a resource-constrained country like India often lead to the development of resistance in *Candida* species. Keeping in view the large number of cases of systemic mycoses found in this study, the need for comprehensive studies in Union Territory of Delhi, as also in other parts of India, on the prevalence of systemic mycoses in HIV- positive patients can hardly be over-emphasised.

3. Antifungal susceptibility profile and molecular typing of *Cryptococcus neoformans* and *Cryptococcus gattii* isolates from India

The pathogenic yeasts *C. neoformans* and *C. gattii* are widespread in decayed wood inside trunk hollows of taxonomically divergent tree species and frequently occur in their surrounding soil in India. During 2008, attention was largely focused on the genetic differentiation and structure of environmental populations of *C. gattii* in India.

Fungal strains: Fifty-eight strains of *C. gattii* isolated from decayed wood of six tree species in six geographic locations in north-western India were selected for the study. All of them belonged to the MATα mating type, and had been isolated during 2001-2006.

Multilocus sequence typing (MLST) and phylogenetic analyses: MLST was conducted for all of the isolates using six gene fragments which included fragments of five nuclear DNA and one mitochondrial gene. The five nuclear DNA markers used for amplification and their chromosomal locations were as follows: *(i)* LAC (chromosome VII) which encodes the laccase / diphenol oxidase; *(ii)* CAP1 (chromosome IV) encodes a capsule synthesis protein; *(iii)* FTR1 (chromosome III) encodes a high affinity iron permease; *(iv)* URA5 (chromosome VII) which is an orotate phosphoribosyl pyrophosphate transferease; and *(v)* Internal transcribed spacer region (ITS) which comprises ITS1, 5.8S rRNA and ITS2 (chromosome II). The mitochondrial marker used was part of the mitochondrial large subunit RNA gene. Fragment amplification by PCR was carried out with each primer. The resulting product was purified and sequenced using ABI1300 sequencer. The sequences of each of the six loci for all isolates were aligned using Clustal X version 2 and edited manually. Phylogenetic analyses were performed using PAUP 4.0b10. Maximum-parsimony trees were constructed for each of the individual fragments based on 500 random sequence additions. Bootstrap analyses to assess the support for the clades were also conducted using 1000 replicate samples of phylogenetically informative characters.

Phylogenetic structure of C. gattii from India: A total of 3004 nucleotides were obtained for each *C. gattii* strain. Our sequence data showed no evidence of heterozygosity consistent with haploidy or homozygosity at these loci for all of the 58 test strains. The entire alignment after manual editing had a total of 37 variable sites. The phylogenetic relationships among the strains were analysed for the six gene fragments, using the neighbour joining (NJ) maximum parsimony (MP) and maximum likelihood (ML) algorithms. All of the three phylogenetic methods resulted in identical trees for all the loci. The two sequenced serotype B strains (WM276 and R265) were used as ingroup taxa while the serotype A strain H99 and the serotype D strain JEC21 were used as outgroups. We found that sequences from strain WM276 (which belongs to the VGI group) clustered more closely with our isolates than strain R265 (which belongs to the VGII group). As expected, both serotype B strains R265 and WM276 clustered more closely with our isolates than either the serotype D strain (JEC21) or serotype A strain (H99). This is consistent with our serological identification *i.e.*, they belonged to serotype B.

Our analyses also indicate that all of our *C. gattii* isolates are clustered within the VGI genotype group whereas the combined dataset for the 58 strains yielded a total of ten multilocus genotypes.

Clonal reproduction of C. gattii in India: The I_A values calculated for each population with more than five isolates indicated that environmental samples of *C. gattii* from India are clonal. We also calculated the I_A values for a much larger cohort of VGI genotypes consisting of samples from Canada, Australia, USA, Columbia, Brazil and Thailand used in a previous study and obtained a similar result. The I_A for this dataset was 1.554, significantly (p<0.0001) higher than 0. The results of the phylogenetic incompatibility test also clearly indicated no evidence of recombination within the VGI population.

Genotype distribution: Of all the genotypes, MGII was the most common, shared by 19 isolates and was recovered from four species of trees and from two geographic locations, namely Delhi and Amrouli. It was followed by MGIII, represented by 12 strains and showing the widest geographic dispersal. It was isolated from Delhi, Bulandshahar, Hathras and Meerut in association with four species of trees *i.e., Azadirachta indica, Syzygium cumini, Polyalthia longifolia* and *Manilkara hexandra*. None of the cities investigated had all the genotypes represented. Several of the multilocus genotypes were found only in a single region. Specifically, MGVIII and MGX were found only in Bulandshahar; MGI, MGIV, MGVII and MGIX were found only in Delhi and MGVI only in Amritsar.

Population structure of C. gattii from India: The analysis of molecular variance identified that geographic separation contributed 32% of the overall genetic variation (p<0.05) while the same geographic region populations contributed 68% variance. The Mantel test showed that the linear genetic distance and geographic distance showed a marginally significant correlation (p<0.010). Similarly, the host-tree species based analyses identified that 79% of the genetic variance was found within host tree species and 21% was found between populations from different host trees (p<0.010).

Our results revealed no evidence of recombination in the analysed populations. Instead, we identified evidence for clonality and clonal expansion. However, the observed clonal expansion has not obscured the significant genetic differentiation among populations from either different geographic areas or different host tree species. The observed genetic differentiation was positively correlated to geographic distance. The results obtained here for *C. gattii* contrasted with those from our recent study on *C. neoformans* var *grubii* from India that showed unambiguous recombination and significant gene flow among populations obtained from the same geographic regions and host tree species.

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 1372 clinical specimens were processed during the year. These included 740 sputa, 451 blood specimens, 118 bronchial lavage / aspirate / washings, 22 endotracheal aspirates, and 41 miscellaneous (nasal discharge / washings / skin scrapings / swabs / urine / pus / pleural aspirate / FNAC) specimens. Besides referral services for identification of clinical isolates of fungi was extended to other institutions on request.

Microbiology

Research

1. Correlation between genetic polymorphism and homeostasis of Th1-Th2 cytokines in pulmonary and extra pulmonary tuberculosis

This study aims to investigate the influence of host genetic factors on the variability of clinical presentation of tuberculosis. In this study, we propose to address the question of the possible influence of genetic polymorphism in cytokine genes of the host on the spectrum of clinical presentation, from pulmonary tuberculosis to lymph node tuberculosis. The panel of cytokine genes selected for the study includes IFN-γ, IL-2, TNF-α, IL-18, TNF-β, IL-4, IL-12B, IL-8, IL-10, IL-6, IL-1RA and IL-1B.

For the study, SNP IDs (rsID) for the cytokines selected were noted from the HapMap data base (www.hapmap.com). Genome sequence of 552 healthy individuals was generated, using ILLUMINA platform for SNP analysis. The data was analysed in our laboratory to determine the frequency of SNP in the cytokine genes in healthy Indian population. In the analysis genotype and allele frequency of the selected rsIDs were calculated. The fixation index (Fst) was also calculated to see the variance between the population groups included using the ALREQUIN software version 3.0.

The genotype frequencies and minor allele frequencies of the Indian populations and those of Hap Map populations were significantly different: But some populations show relatedness with Hap Map populations like Tibeto-Burman population of north eastern and northern India show relatedness with Chinese Han and Japanese populations. The out-group isolated population of western India shows relatedness with the African Yoruban populations. The mean Fst (value of the Indian population (calculated from 32 SNPs and 24 population groups) is 0.07±0.05 which is low. However, the SNPs for the rs2243270 (IL-4), rs2243266 (IL-4), rs2070874 (IL-4), rs315951 (IL-1RA), rs3213448 (IL-1RA), rs3181052 (IL-1RA), rs4252019 (IL-1RA) and rs380092 (IL-1RA) have higher Fst values 0.13 to 0.18. This information may help in population differentiation during later analysis of the patient data. For example, one of the SNPs, rs2070874, has the minor allele (T) frequency ranging from 0.09 to 0.78. In some of the populations IE-NE-IP1, IE-N-IP2, TB-NE-LP1, TB-N-IP1, TB-N-SP1, CHB and JPT the minor allele T has become major allele. This observation can be used as reference input when similar frequency data from patient population will be subsequently analysed. The SNPs involved in this population may be related to the disease outcome in reference to susceptibility or resistance to tuberculosis. In further analysis, cytokine assays for two important cytokines IFN-γ and TNF-α were done and it was found that the difference in concentrations of IFN-γ in (43) patients and (43) healthy individuals were not statistically significant (p=0.16) although it was seen that the concentration of IFN-γ was higher in patients (22.05 pg / ml) than the healthy individuals (11.12 pg / ml). And the difference in concentrations of TNF-α between the same patients group and healthy individuals was statistically significant (p=0.01). However, the concentration of TNF-α was higher in the healthy individuals (13.21pg / ml) than in the patients (37.58 pg / ml).

2. Plasticity of human primary macrophage response to a multidrug-resistant *Mycobacterium tuberculosis* strain

Strain variation of MTB has drawn attention recently as a probable causal factor to elicit variable degree of severity of a disease in the human hosts. Moreover, MTB isolates from patients with similar characteristics had remarkable variation in transmission rates when studied in animal models, again consistent with the idea of intrinsic biological differences between strains. The W / Beijing, HN878 and CDC1551 are some of the MTB strains that have been studied in detail to understand the effect of genetic and phenotypic variation of MTB on the virulence of the organism and severity of the disease.

A strong hypothesis is in favour of a role played by the host factors in tuberculosis susceptibility because only 10% of the infected individuals develop active clinical disease. An integrated approach is important and necessary to understand the role played by the diversity of the host in the context of the immune response and the variable pathogenic potential of MTB strains that ultimately decides the outcome of such an interaction. Such studies may lend a direction to the development of an effective tuberculosis control strategy, in the context of MDR-TB. The present study was designed to address this hypothesis.

In our previous report we demonstrated difference in the immune response of different categories of patients particularly MDR-TB patients to the laboratory *M. tuberculosis* strain H37Rv. In the present study, we investigate whether different categories of patients differ in their response to a multidrug-resistant *M. tuberculosis* clinical isolates, strain #591, in comparison to H37Rv. The host category included were MDR-TB patients, fresh active (Category I-TB) patients and healthy volunteers.

Monocyte derived primary macrophages (MDM) from three subject groups (21 MDR-TB, 17 Category-1 TB patients and 10 healthy BCG vaccinated individuals) were investigates for immunologic and pathogenic response to a clinical multidrug-resistant *M. tuberculosis* STRAIN #591. MDM was assayed by CFU. TNF-α, IL-12, and nitric oxide were estimated from culture supernatant of CD14 positive MDM. Immunologic response to strain #591 was complex and diverse. In MDR-TB patients the CFU was high in spite of high TNF-α and IL-12. Nitric oxide was at the basal level. In Category-1 TB patients CFU was moderately high though TNF-α and IL-2 were very high. In contrast healthy MDM could control intracellular growth of #591 to a significantly low level as compared to pulmonary TB patients ($p<0.005$) although TNF-α and IL-12 dipped below the basal value. Nitric oxide release however remained at the basal level**.** Our results suggest that the MDR-TB strain may induce variable immune response in a host dependent manner. Additionally the intracellular survival of MDR-TB strain in human MDM may be attributed to its pathogenic potential.

3. Functional analysis of the mammalian cell entry (mce) proteins of mycobacteria

Tuberculosis is essentially a pulmonary disease mainly produced after bacillary inhalation. The initial step in the pathogenesis by intracellular pathogens is the invasion of host cells. We have cloned and expressed *mce4A* (*Rv3499c*) gene and shown its role in invasion and survival. During the overexpression of *Mce4A* protein in *E. coli* it forms inclusion bodies which was solubilised in 8M urea and purified *Mce4A* protein in denaturing condition. Furthermore, we have refolded the denatured *Mce4A* by step-wise dialysis method in which urea was gradually removed. During this process we have also added L-arginine, reduced and oxidized form of glutathione to enhance the process of proper refolding. To check whether refolded proteins are in biologically active conformation we performed invasion assay with latex beads coated with refolded *Mce4A* protein and visualised the results by electron microscopy. Transmission electron microscopy results show the internalization of *Mce4A* coated latex beads.

Effect of *Mce4A* protein on the viability of THP-1 cells was also checked by MTT assay. MTT assay results indicated that *Mce4A* can inhibit the viability of THP-1 cells. The expression levels of cytokines were analysed through ELISA to test if *Mce4A* protein had effect on cytokine release in macrophages. Supernatant of macrophages treated with *Mce4A* protein at the concentration of 400pg / ml was collected at 2h, 4h, 24h, 48h and 72h and supernatant of unactivated macrophage was collected in parallel for ELISA. Levels of TNF-α, IFN-γ, IL-4 and IL-10 in the supernatant were estimated. Analysis of the results showed that expression of TNF-α and IFN-γ from macrophage was up-regulated following treatment of the THP1 cells with the recombinant *Mce4A* protein of *M. tuberculosis.* In contrast, expression of IL-4 and IL-10 was unaffected. The levels of TNF-α were highly significant at all time points and the concentration was highest at 48h in comparison to basal level.

4. Functional analysis of *lprN* gene of *mce4* operon of *M. tuberculosis*

When experimental animals were infected with *M. tuberculosis* (H37Rv), expression of *mce4* was observed along with *mce1* and *mce3* in the pulmonary infection in rabbit and *mce4* alone in the spleen of guinea pig. The above results indicate that the expression *mce3* and *mce4* operons may be attributed to the infection phase in the animals. Therefore, the expression of proteins of *mce3* and *mce4* operon could provide an insight into the pathogenesis and immunity against *M. tuberculosis.* One of the genes of *mce* operons, the *lpr* genes, are predicted to code for lipoprotein precursors. The lipoproteins are reported to be powerful antigens that induces strong antibody and cell mediated immune response. Therefore, present study aims at understanding the functional relevance of lipoprotein encoded by the *lprN* gene of *mce4* operon of *M. tuberculosis*.

The *lprN* gene was amplified as 1155bp product and cloned in pET28b expression vector having C terminal his tag. The LprN protein was purified as 41kDa protein by affinity chromatography using nickel-nitrilio acetic acid. The native purified LprN protein was subsequently injected in mice at different concentrations in order to study the immune response generated against it. Furthermore, genetic difference among ~100 clinical

isolates varying in their drug susceptibility profile in *mce4* operon had shown that *lprN* gene is significantly most polymorphic in its respective operon. The spleen cells from the BALB / C mice were separated and thymidine uptake study has been performed to assess the immuno-stimulatory effect of the recombinant *lprN* protein. Initial results show that *lprN* protein is highly immunogenic.

5. Role of *lspA* gene in the biology and pathogenesis of *M. tuberculosis*

The mycobacterial cell envelope is a complex structure, and lipoproteins make a huge proportion of bacterial cell envelopes. Lipoproteins of Gram-positive bacteria are involved in a broad range of functions such as substrate binding and transport, antibiotic resistance; cell signalling, or protein export and folding. The NH_2-terminal signal sequences of lipoproteins are specifically processed by a unique signal peptidase, named type II signal peptidase (or SPase II) which is encoded by *lspA* gene (RV1539) of *M tuberculosis.* Lipoprotein processing by the type II signal peptidase (SPase II) is known to be critical for intracellular growth and virulence for many bacteria, but its role in *M. tuberculosis* is unknown or poorly understood. The present study proposes to establish the role of *lspA* gene (Rv1539) in the biology and pathogenesis of *M. tuberculosis. lspA* is the only gene known in *M. tuberculosis* to be involved in the processing of prolipoproteins. It is not present in Archaea and Eukaryotes. As it is a significant determinant of the pathogenicity of *M. tuberculosis*, it may serve an important target for chemotherapy. In order to study the expression profile of *lspA* gene, we checked its expression *in vitro* and during the course of infection of macrophage (THP-1 cell line) by *M. tuberculosis*. The results show that *lspA* gene of *M. tuberculosis* is expressed in broth culture both at log phase and stationary phase. The gene is also expressed following infection of macrophages by *M. tuberculosis* as shown by the demonstration of expression of *lspA* specific RNA by RT-PCR at 0hr and 24hrs post infection.

For the functional characterisation of *lspA*, it was cloned in pET22 b^+ vector. The protein was purified under denaturing conditions and was re-natured by dialysis. Polyclonal antibodies were raised against LspA recombinant protein of *M. tuberculosis* was over expressed. The recombinant protein will be used to check the presence of antibody to this protein in patients' sera.

6. An intergenic promoter mutation in *mce1* operon in a multidrug-resistant clinical isolate of *M. tuberculosis* leads to gain of function

The aim of the present study was to look for promoter activity in the non-coding sequence in the intergenic region of Rv0166 and Rv0167 genes of *M. tuberculosis* H37Rv. The further aim was to study the effects of a point mutation at this site in a clinical isolate. Our analysis for single nucleotide variations in the genome of clinical isolates revealed a change from G to C in the intergenic region upstream of Rv0167 at –61 position in an isolate designated VPCI #591, where a putative promoter activity was predicted by *in silico* analysis. We characterised the region as a promoter using promoterless vector with β-galactosidase as reporter. We identified two transcription start sites suggesting the presence of two potential promoters for *mce1* operon generating two types of transcripts, one including Rv0166 and the other without it. The deletion analysis mapped the mutation downstream to the region of promoter activity. Based on a comparative analysis of the promoter activity of *M. tuberculosis* H37Rv and VPCI #591, we could conclude that this point mutation leads to gain-of-function perhaps by abolishing negative regulation. Our observations indicate that the clinical isolate VPCI#591, which is also a multidrug- resistant strain of *M. tuberculosis,* appears to be natural over-expression model for mce-operon. We could detect the presence of protein(s) interacting with this cis-element from *M. tuberculosis* H37Rv by electrophoretic mobility shift assay.

Our study indicates the possible differential expression of *mce 1* operon that can result in transcript with the f*adD5* gene and one with out it. The gain-of-function mutation abolishing negative regulation of *mce1* operon in the clinical isolate is a over-expression model and can be used for studies on the attenuation of *M. tuberculosis* in the context of the high virulence of *mce1* knock-out.

7. Study of genotypic diversity of *M. tuberculosis* isolates from patients of pulmonary tuberculosis attending a referral center and a DOTS center in North Delhi region in India

The aim of the present study was to genotype 101 *M. tuberculosis* isolates obtained from 134 patients of pulmonary tuberculosis attending a referral center for patients with respiratory diseases in North Delhi region in India. Spoligotyping was used as a primary molecular typing technique which subdivided the strains into 49 types, including 14 clusters and 35 unique types. The most frequent spoligotype was SIT26, followed by

SIT11, representing 20.8% and 10.9% of all strains in the study. IS*6110* restriction fragment length polymorphism (RFLP) typing was carried out for 80 of the 101 isolates studied, including all the isolates found to be clustered by spoligotyping. RFLP typing could genotype 62 *M. tuberculosis* strains with high copy number of IS*6110* bands into the same number of unique types. Eighteen isolates had low copy number of IS*6110* bands and could not be typed by RFLP. An 11 locus [mycobacterial interspersed repetitive units (MIRU) – variable number of tandem repeats (VNTR)] (MIRU-VNTR) typing was applied to all 101 isolates. MIRU-VNTR could differentiate all the isolates into unique types. MIRU locus 31 was found to be most discriminatory with an allelic diversity of 0.76. The discriminatory power (Hunter-Gaston Index) of spoligotyping, IS*6110* typing and MIRU-VNTR typing was found to be 0.94, 0.99 and 1 respectively. In conclusion, the 11 loci MIRU-VNTR typing method was found to be most discriminatory for the *M. tuberculosis* strains in North Delhi and emphasised the rich diversity of *M. tuberclosis* isolates in this region.

8. PCR restriction analysis for early identification of *M. tuberculosis* from clinical samples

An attempt was made to apply PCR-restriction fragment length polymorphism (PRA) technique for early detection and identification of *M. tuberculosis* directly in cultures and clinical samples. An attempt was also made to look for novel restriction enzymes to develop a PCR restriction analysis assay which could be used as a screening assay. *hsp65* PRA based on the methodology of Wong *et al*, was applied on the DNA extracted directly from the sputum samples (n=236) collected from the same number of patients. We could detect and identify *M. tuberculosis* in 81% of the AFB smear positive samples (n=149) and 7% of AFB smear negative samples (n=28) obtained from patients with clinical and radiological evidence of tuberculosis. *M. tuberculosis* was not detected in 59 AFB smear negative sputum samples obtained from patients suffering from respiratory diseases other than tuberculosis. To test the sensitivity of the assay, a smear negative sample was spiked with serial dilutions of H37Rv. The protocol could detect down to 100 organisms / ml. PRA was found to be a simple and reproducible method for early detection of *M. tuberculosis* from sputum samples.

The present assay could be used to augment conventional methods of diagnosis of mycobacterial diseases; to differentiate between *M. tuberculosis* complex and MOTT, directly in clinical samples. It could help clinicians in deciding chemotherapeutic agents early which would considerably reduce the morbidity due to mycobacterial diseases.

Novel Primer Set to Detect and Identify M. tuberculosis

Using bioinformatics, we have designed a new set of primers for a 308 bp region of the *hsp65* gene different from the primers used in the above mentioned study. Our BLAST analysis confirms that the region of *hsp65* gene amplified by this primer set is present only in mycobacteria. Additionally, screening by Mapdaw software (DNA Star) searched out an exclusive cleavage site for the restriction enzyme NruI that cleaves this region of the *hsp65* gene only in the *M. tuberculosis* complex and *M. smegmatis* into two easily discernible bands, as visualised on agarose gel. This enzyme does not have any restriction sites on non tuberculous mycobacteria other than *M. smegmatis*. We have also identified a second enzyme which would act only on *M. tuberculosis* complex and not on *M. smegmatis*. Hence, once the PCR product is restricted, this would confirm the presence of *M. tuberculosis*. The primer set designed by us is a novel one, absolutely different from the primers for *hsp65* gene reported so far. We have studied 25 cultures with these primers. All the cultures were identified to be *M. tuberculosis*. The sensitivity of the assay was tested by spiking a smear negative sample with serial dilutions of H37Rv. The protocol could detect down to 10 organisms / ml. Effort is on to improve the sensitivity of the assay.

9. Analysis of rifampicin resistance mutations in clinical isolates of *M. tuberculosis* by a mutant probe in a dot blot format

We continued developing a dot blot hybridisation assay to detect all mutations occurring in the *M. tuberculosis rpoB* hot-spot region. The assay uses five probes (A to E) capable of binding to different target segments within the *rpoB* hot-spot region of the wild type *M. tuberculosis* genome. Absence of hybridisation with any of the probes in the assay when a mutation is present indicates rifampicin resistance, a surrogate marker for multidrug-resistant *M. tuberculosis.* The assay has been standardised for probes D and E which detect 75% of rifampicin resistance mutations. We have further worked with probe B which detects additional 20% of the rifampicin resistance mutations. The assay has been standardised for probe B also. However, we are also working towards detecting mutations with a mutant probe, with a mutation at the 5' end of the probe,

which would be more sensitive than the wild type probe.

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

Antibiotic susceptibility: Antibiotic susceptibility of 100 *S.pneumoniae* isolates was carried out using the Kirby Bauer's disk diffusion technique. Seventy-four isolates were resistant to oxacillin. Nineteen were resistant to erythromycin. Fifty-one were resistant to tetracycline. Most of the isolates were found resistant to co-trimoxazole. Thirty-nine were resistant to ciprofloxacin and 20 were resistant to chloramphenicol.

Minimum inhibitory concentration (MIC): Only 4 isolates were found resistant (MIC>= 2), 16 intermediate sensitive (MIC 0.5-1) to penicillin by MIC testing. Seven intermediate sensitive (MIC= 0.5) and four were found resistant (MIC =1) to erythromycin. Hence MIC testing is a better indicator of penicillin resistance.

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 90 isolates of *S. pneumoniae*. The 3 sets of reactions identified serotypes in 31 / 90 (34%) isolates. They were 19A (5), 19F(4), 1(8), 6(3), 7F(4) and 14(3), 12F(2), 9V(2). The work of carrying the remaining reactions for more serotypes is underway.

Direct detection of Streptococcus pneumoniae in clinical samples using two-step PCR: Direct detection of *S. pneumoniae* was carried out in 150 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 150 samples tested 33 were positive by PCR. Of these six was also culture positive. However, 11 samples, which were positive by PCR, was culture negative showing that PCR was more sensitive in detecting *S. pneumoniae* in clinical samples.

More pneumococcal strains have been tested for antibiotic susceptibility, minimum inhibitory concentration, serotyping using multiplex PCR, and direct detection of *S. pneumoniae* from clinical samples using PCR.

11. Detection of AmpC β-lactamases in clinical isolates of *Klebsiella* spp. and *E. coli*

A total of 250 isolates each of *Klebsiella* spp. and *E.coli* were screened for cefoxitin (30µg) by Kirby Bauer disc diffusion method. Of these isolates, 75(30%) of *Klebsiella* spp. and 71(28.4%) isolates of *E.coli* showed reduced susceptibility to cefoxitin and were considered as screen positive.

All the screen positive isolates were subjected to four different phenotypic tests *viz:*

a. Modified Three Dimensional test,
b. AmpC disk test I,
c. AmpC disk test II,
d. Inhibitor (Boronic acid) based detection method.

Modified Three Dimensional test and AmpC disc test I detected 25(33.3%) isolates of *Klebsiella* spp. and 29(~41%) of *E.coli* to be AmpC producers, where as AmpC disk test II could detect only 21(28%) isolates of *Klebsiella* spp. and 19(~27%) of *E.coli* to be AmpC positive. Inhibitor based detection method detected, AmpC β-lactamases in 25(33.3%) isolates of *Klebsiella* spp and 29(~41%) isolates of *E.coli.*

Comparative evaluation of the above mentioned tests was also carried out which showed that Inhibitor (Boronic acid) based detection method could detect more number of isolates to be AmpC producer and hence was the sensitive of the four techniques. Polymerase chain reaction (PCR) was carried out on all the screen positive isolates. PCR showed out of 75 screen positive isolates of *Klebsiella* spp., 20 isolates were harboring *ampc* gene, out of which 14 isolates were of CIT family whereas, six belonged to EBC family. Whereas, in *E.coli*, out of 71 screen positive isolates 25(35.2%) isolates were harboring *ampc* gene, out of which 20 were of CIT family and five belonged to EBC family.

12. Detection of metallo β-lactamases (MBLs) in clinical isolates of *Pseudomonas aeruginosa*

A total of 300 clinical isolates of *Pseudomonas aeruginosa* were screened for metallo β-lactamases (MBLs) by checking their susceptibility to imipenem (IPM) (10µg) and ceftazidime (CAZ) (30µg) disks by Kirby Bauer disk

diffusion method. Of these isolates, 128 (~43%) were screen positive. Out of these 128 isolates, 68 (~53%) were both IPM non-susceptible and CAZ resistant, 14 (~11%) isolates were only IPM non-susceptible and 46 (~36%) isolates were only CAZ resistant.

All the screen positive isolates were subjected to four different phenotypic tests *viz:*

a. Modified Hodge test (MHT),
b. Combined Disk test (CDT),
c. Double Disk Synergy test (DDST),
d. Extended EDTA Disk Synergy test (eEDST),
e. EDTA-Imipenem microbiological (EIM) Assay.

Modified Hodge test detected 87/128, EIM Assay 75/128, Combined Disk Test 73/128, Extended EDTA disk synergy test 71/128 and Double disk synergy test 67/128 of the screen positive isolates as MBL producers. Modified Hodge test detected the maximum number of isolates to be MBL producers, followed by EIM assay. Double disk synergy test detected the minimum number of isolates to be MBL producers. Polymerase chain reaction (PCR) was carried out on all the screen positive isolates. PCR detected *bla* VIM gene in 76 isolates.

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	1969
Urine	146
Bronchial aspirate	73
Bronchoalveolar lavage (BAL)	40
Pleural fluid	35
Blood	31
Endotracheal aspirate	23
Bipap swab	14
Pus	03
Throat swab	04
Miscellaneous	19
FNAC	06
Total	**2363**

Organisms Isolated	***No.***
Pseudomonas spp.	61
Pseudomonas aeruginosa	78
E. coli	43
Klebsiella spp.	18
Klebsiella pneumonia	18
Klebsiella oxytoca	07
Citrobacter spp.	01
Enterobacter spp.	08
Proteus mirabilis	02

Acinetobacter spp	39
Moraxella catarrhalis	21
Haemophilus influenzae	15
Streptococcus pneumoniae	44
Staphylococcus aureus	18
Staphylococcus spp.	04
Enterococcus	04
Total	**381**

ii. Mycobacteriology Laboratory

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

Nature of Specimen	***No.***
Sputum	6220
Bronchial aspirate	88
Post bronchoscopy sputum	136
Pus	20
Bronchoalveolar lavage (BAL)	71
FNAC	09
Pleural Fluid	50
Endotracheal aspirate	17
Tracheal aspirate	05
Urine	04
CSF	01
Total	**6621**

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

Nature of Specimen	***No.***
Sputum	75
Bronchoalveolar lavage (BAL)	02
Bronchial aspirate	01
Pleural fluid	07
Pus	02
Lymphnode biopsy	01
CT guided FNAC	03
Total	**91**

Pathology

Research

1. Comparison of haematological and coagulation profiles with clinical characteristics and outcomes in patients admitted in ICU with acute exacerbations of COPD

Chronic obstructive pulmonary disease (COPD) subjects in acute exacerbation have abnormalities in haematological and coagulation profiles and are risk factors of poor outcome. Eighty-seven patients with average age 57.15±12.36 years (Males-69, Females-18) were included in the study. Haematological parameters (haemoglobin level, total leucocyte count, differential leucocyte count) and coagulation parameters (PT, APTT, platelet count) were assayed. Clinical characteristic included age, sex, duration of disease, smoking status, pack years of smoking and were correlated with patient outcome. Average duration of ICU stay was 4.03±2.38 days. 70.1% (61 / 87) patients with acute exacerbations of COPD (AECOPD) had smoking history with mean ± SD of 19.43±18.72 pack years. In smokers, significant negative correlation of platelet counts was seen with duration of ICU stay (r=-0.341, p=0.016). In male patients the number of pack years of smoking correlated significantly with duration of ICU stay (r=0.216, p=0.044). In female patients significant negative correlation of prothrombin time with duration of stay was seen (r=-0.597, p= 0.031). Mean haemoglobin levels were 10.96 gm / dl in nonsmokers and 11.68 gm / dl in smokers. In smokers, haemoglobin levels showed significant negative correlation with patient age (r = -0.398, p =0.001). 11.49% (10 / 87) patients expired. In these patients significant correlation with history of smoking was seen by Chi Square test (p<0.02). The dynamic trace of coagulation and haematological data in these patients is emphasized in order to reduce the associated morbidity and mortality.

Diagnostic Services

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

A. Haematology

All blood samples were analysed using automated five part analyser – Melet Schloesing 9-5A. A total of 21,569 samples were done during the period as per details given below.

Haematology tests	Number
Haemoglobin estimation	15,395
Total leukocyte count	15,395
Differential leucocyte count	15,395
ESR	2964
Absolute eosinophil count	622
Platelet count	2413
Peripheral smear	116
P / S for malarial parasite	58
Reticulocyte count	01

Coagulation Laboratory

A total of 256 samples were done during the period as per details given below.

Coagulation Test	Number
Prothrombin time	15
Activated partial thromboplastin time	15
D-dimer	16
Fibrinogen degradation product	11
Bleeding time	199
Clotting time	199

B. Histopathology

A total of 154 biopsies were done during the period as per details given below.

Biopsies Processed	Number
Lung biopsy	152
Skin biopsy	02

C. Cytopathology

A total of 794 samples were done during the period as per details given below.

Cytology Sample Processed	Number
Sputum	420
BAL fluid	84
FNAB: Percutaneous	127
Transbronchial (TBNA)	30
Bronchial aspirate	59
Pleural fluid	74

D. Clinical Pathology

A total of 1455 samples were done during the period as per details given below.

Urine Analysis	Number
Specific gravity	1453
pH	1453
Albumin	1453
Sugar	1453
Microscopic examination	1453
Ketone bodies	02

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

"National Seminar on Diagnostic Bronchology" (8th CME) held on 29th June 2008. *Dignitaries on the dais (left to right)*: Dr A.K. Sood, Executive Director, National Board of Examinations, New Delhi; Dr V.K. Vijayan (Director, VPCI); Prof. Raj Kumar, Organising Secretary of the Seminar.

Pharmacology

Research

1. Possible protective role of Livina (a polyherbal preparation) against antitubercular therapy (ATT)-induced hepatotoxicity

A single blind, randomised, placebo controlled study is being conducted to evaluate the efficacy of Livina (a polyherbal formulation) against anti-TB drug therapy induced hepatotoxicity. The study protocol has been approved by the Ethical Committee of the VPCI and after taking written informed consent from study subjects, the patients were divided into two groups; one receiving 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. Thirty-six patients have since completed the study. On interim analysis of the currently obtained qualitative and quantitative data, it appears 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). A total of 42 patients, who were enrolled for the study, have completed the trial, and the analysis of results showed that the experimental drug was more effective and better tolerated than the placebo. Livina, which was earlier shown to be effective in other forms of liver disease, now appears to have great potential against ATT-induced liver dysfunction. A detailed evaluation of its mechanism of action at the cellular and molecular level is planned.

2. 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 study is being performed to evaluate the efficacy and safety of UNIM-352, a polyherbal Unani formulation, in patients of bronchial asthma. After taking due clearance from the Ethical Committee of the VPCI and written informed consent from the study subjects, the patients were divided into two groups – one receiving UNIM-352 and the other receiving placebo. After baseline pulmonary function test (PFT) data was recorded the patients were put on standard anti-asthma treatment with bronchodilators and steroids as inhalation therapy. PFT data was recorded in both groups at 2, 4, 6, 8 and 12 weeks, as also the frequency of use of SOS salbutamol inhalers. Forty patients have since completed the study, and analysis of initial results 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 initial results are encouraging suggesting a potential role for this polyherbal as an adjunct in the treatment of bronchial asthma. A total of 100 patients are to be enrolled in this study, which is continuing.

3. Comparative study to evaluate the efficacy and safety of theophylline and doxofylline in patients of obstructive airway disease

Methylxanthines are strongly emerging as useful adjunct agents in the treatment of obstructive airway disease. An open label, parallel design, study was designed to compare the efficacy and safety of theophylline and doxofylline in patients of bronchial asthma and COPD. The study protocol was approved by the Institutional Ethical Committee and written informed consent was taken from study subjects as per GCP guidelines. A total of 60 patients – 30 each of bronchial asthma and COPD (diagnosed as per GINA and GOLD guidelines), were enrolled for the study. In addition to standard treatments for asthma and COPD, they received either theophylline or doxofylline (both at 200 mg BD orally) in a randomised fashion. These patients were followed up at 1, 2, 3 and 4 weeks after initiation of therapy, and the following were recorded: *(a)* PFT parameters (FEV_1, FVC and FEV_1 / FVC ratio), *(b)* symptomatology score, and *(c)* frequency of emergency bronchodilator (levosalbutamol) use. Adverse drug reactions (ADR) were also monitored in both groups of patients as per the guidelines and proforma of the National Pharmacovigilance Programme. Initial observations indicated that doxofylline may be safer and better tolerated than theophylline on the basis of the frequency and intensity of ADRs. However, the PFT data and symptomatology score need to be analysed in detail to predict the comparative efficacy of these two drugs, before concluding on the relative efficacy of both drugs when used in asthma and COPD.

4. 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, was assessed in both male and female rats, and their possible correlation with NO ergic mechanisms was 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. Male rats were more susceptible to stress induced changes as compared to females, and both brain and plasma levels of stable NO metabolites (NOx) were higher in females as compared to their male counterparts after RS exposure. The effects of NO precursors were also greater in males. Oxidative stress accompanied emotional stress induced biological changes. NO mimetics attenauated changes in MDA and GSH seen after RS, whereas, NO depletors showed inconclusive effects. Repeated stress exposure induced behavioural tolerance was also greater in females, as seen in the elevated plus maze test. Female rats had significantly greater NOx levels in the brain homogenates as compared to their male counterparts. Stress-induced gastric ulcer susceptibility was also greater in males as compared to females, and this correlated well with plasma NOx levels. Stress induced immunomodulation was also greater in males and NO mimetics reversed these changes. Plasma NOx levels were higher in females than males. These results indicate that males and females react differently to stress, and NO may be having a regulatory influence in this such sex-related differential nature of stress reactions.

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

Endogenous opioids are important neuromoulators during stress reactions and μ, k and δ receptors have been implicated. Initial studies showed that nitric oxide (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 neurobehavioural, 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, *(b)* elevated plasma corticosterone, and *(c)* suppressed adaptive immune responses. Such stress responses were attenuated by morphine in a dose related manner. The opioid antagonist, naltrexone, showed opposite effects, and the k-antagonist, norbinaltorphimine, showed mixed responses. Neurobehavioural data after acute and repeated RS exposure showed a good correlation with brain biochemical data (NOx). Pretreatment with the NO depletor, L-NAME, attenuated morphine effects during RS. Further, subthreshold 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. These initial results are encouraging, and suggest that opioids like morphine may act through NO during stress ameliorating effects. Further, studies involving neuroendocrinal and immunological markers are in progress and likely to reveal a meaningful hypothesis in relation to this problem.

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

Polyherbals have definite advantages over their monoherbal counterparts and are being promoted as alternative modes of therapy in critical pathophysiological states. Bronchial asthma is a chronic inflammatory disorder of the respiratory tract and complex pathways are involved in its genesis. Inflammation and immunity are two closely related processes and both of these are involved in bronchial asthma. 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. The present study evaluated the possible anti-inflammatory and immunomodulatory effects of UNIM-352 in experimental models of inflammation and immunity relevant to asthma. Studies were conducted in albino rats, and both pharmacological and biochemical parameters were assessed. Initial experiments showed that, orally administered UNIM-352 (200 and 400 mg/kg) dose dependently attenuated TNF-α levels in both blood and BAL fluid, with the latter effects being greater in

magnitude. The polyherbal agent also enhanced SOD and catalase levels in blood. The effects of the drug on NOx levels were less consistent. In stressed rats, similar changes were seen and UNIM-352 was more effective in reversing the changes induced by stress. In addition, in stressed rats, GSH levels were lower than non-stressed rats, and this also was attenuated by the polyherbal. Studies on other inflammtory and immunological markers are in progress and these results will throw more light on the pharmacodynamics of this drug.

7. 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

Overuse of antibiotics has contributed to the emergence and spread of antimicrobial-resistance. Resistance to antibiotics is a major public-health problem and antibiotic use is being increasingly recognised as the main selective pressure driving the resistance. Aim of our study is to assess outpatient use of antibiotics and association with resistance. We are trying to find out the behaviour of all the stakeholders involved in the use of antibiotics. Phase I project has established and standardised the methodology.

Objectives of the study

a. Surveillance of antimicrobial use in the Private pharmacies, Public facilities and Private practitioners,
b. Dissemination of the results of Phase I study to all the stakeholders,
c. Investigate the reasons for irrational use of antibiotics with all stakeholders through focus group discussions and in-depth interviews,
d. In-depth group discussions and planning suitable and sustainable interventions with all stakeholders.

The second phase of the study is started from November 2007. Data on consumption of antibiotics was collected by doing exit interviews of the patients purchasing / prescribed any antibiotic from different facilities. As the resistance is being conducted at Ganga Ram Hospital, data was collected in four localities around that hospital. Data was collected from 20 retail pharmacies, 10 public hospitals and dispensaries and 20 private practitioners and specialists in the catchment area. The work was started from November, after a pilot survey, and the data for actual survey started from December 2007. The study was for 12 months and the target number of exit interviews was conducted at each facility per month. Data collection was complete in November 2008.

A suitable and sophisticated computer programme has been designed for data entry. Results are being analysed.

This is a collaborative work with microbiology department of Sir Ganga Ram Hospital for resistance pattern antimicrobial with WHO as co-partner.

8. Focus group discussions with various stakeholders for behavior of antibiotic use in the community and planning of suitable interventions for rational use of antibiotics

The various stakeholders that are important for antibiotic use are;

Doctors
Pharmacists
Community
Community leaders – RWAs, MLA, Councilors
NGOs
School children and teachers.

With the help of a social scientist meetings with all stakeholders were conducted. Three meetings and focus group discussions each with public and private sector doctors, pharmacists were conducted. Three meetings and focus group discussions (FGDs) with community leaders, community and RWAs were held.

Six schools, both public and private participated. FGDs were held with high school children and high school teachers of all six schools.

Qualitative analysis of all the FGDs conducted is being done for antibiotic use.

9. Use of antibiotics in ARI and diarrhea in the community

Irrarational use of antibiotic is very common in acute respiratory infections (ARI) and diarrhea. Antibiotics are commonly prescribed for the said two conditions in the community. Overuse of antibiotics is one of the important factors that lead to antibiotic resistance.

Twelve months data was collected from both public facilities (Delhi government 8 dispensaries and 2 secondary care hospitals) and 20 private GPs and specialists. Exit interviews were conducted for the patients having either ARI or diarrhea and visiting these facilities and details of the prescriptions containing antibiotics were noted. Data entry and analysis is to be done for the study.

10. Effect of tadalafil (a novel phosphodiesterase- inhibitor) in hypoxia induced pulmonary hypertension in rats

Pulmonary hypertension (PH) is a hemodynamic state shared by a variety of disorders with diverse etiology and pathogenesis. Hypoxia induced pulmonary vasoconstriction (HPV) is a physiologic regulatory mechanism to minimise ventilation-perfusion mismatch in the lung. However, during global hypoxia, as seen at high altitude, this results in severe increase in pulmonary vascular resistance, pulmonary hypertension, right ventricular dysfunction and pulmonary edema. This is an important problem for the lowlanders deployed to high altitude stations. A major cGMP-degrading phosphodiesterase in the pulmonary vasculature is upregulated in PH. Phosphodiesterase 5 (PDE5) inhibitors are promising therapeutic agents for the treatment of PH. Tadalafil, a newer phosphodiesterase 5 (PDE5) has been shown to be more selective than sildenafil towards PDE5 relative to PDE6 inhibition. Therefore, it may account for the lower frequency of visual side effects. Tadalafil may sponsor higher compliance to treatment of PH since its half-life is longer, with one single administration.

Therefore, we aim to study the effect of tadalafil in acute pulmonary vasoconstriction and chronic pulmonary hypertension.

Objectives of the study

a. To investigate the effect of tadalafil on hypoxia induced acute and chronic pulmonary hypertension,
b. to study the effect of tempol on hypoxia induced acute and chronic pulmonary hypertension.

For induction of acute pulmonary vasoconstriction in rats, lungs were mechanically ventilated with a hypoxic mixture of oxygen (10%O_2) for 30 minutes. After 30 minutes of hypoxic ventilation and obtainment of stable hemodynamic conditions, measurements were repeated. Right ventricular pressure (index for pulmonary arterial pressure), systemic blood pressure, heart rate were recorded using pressure transducers and software supported Power Lab data acquisition system.

For induction of chronic pulmonary hypertension animals were exposed to hypobaric hypoxia in a chamber with controlled pressure of 380mmHg. For chronic exposure, animals were exposed to intermittent hypobaria for 8 hours daily for 15 days. Effect of tadalafil was examined in both hypoxia induced acute pulmonary vasoconstriction and in hypoxia induced chronic pulmonary hypertension. Tadalafil significantly reduced hypoxia induced rise in right ventricular pressure and right ventricular contractility both in acute and chronic cases without producing any significant change in systemic blood pressure. To examine the role of free radicals in hypoxia induced pulmonary hypertension the biochemical experiments are in progress.

11. Factors associated with poor asthma control and poor adherence to asthma treatment: self report by patients in emergency room

The impact of asthma on quality of life and outcome of the disease are closely associated with adherence to therapy. Consequences of non-adherence to asthma treatment leads to poor control of asthma, which eventually leads to limitation of daily activities, unnecessary frequent health care visits, visits to emergency department, hospitalisation and progression of disease with increased risk of fatal or near fatal asthma. The reasons for non-adherence with controller therapy are many. Although reasons for non-adherence have studied by many investigators in the developed countries, but present knowledge about reason for adherence is limited. However, not much work is done in India to find out the factors that contribute to poor asthma control and non-

adherence to controller therapy. Hence the present study is being conducted in Vishwanathan Chest Hospital (VCH) of Vallabhbhai Patel Chest Institute (VPCI), Delhi with objective to explore various factors responsible for poor asthma control and non-adherence to asthma treatment.

This questionnaire study of self-reported adherence, management behaviour and barriers to asthma care being carried out in adult asthma patients visiting emergency room (ER) for an acute asthma exacerbation.

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

The study was designed to investigate the proconvulsant role of theophylline in pentylenetetrazole induced seizures and kindling behaviour. Earlier we have shown the close relationship of theophylline with ROS and RNS in its chemical / pharmacological effects, which are indicative of its anti-inflammatory and immunomodulatory effects. The study was designed to assess theophylline induced convulsions and correlate with the anti-oxidant / pro-oxidant status in the brain. Modulation of these effects with anti-oxidants was seen and melatonin was particularly effective in this regard. Combination of melatonin with L-NAME or 7-nitroindazole, the NO synthase inhibitors had a greater effect than melatonin alone. These effects were true for both convulsiogenic and pro-convulsant effect (in combination with sub-threshold dose of pentylenetetrazole) of theophylline. Studies in respect of theophylline and its potentiation of PTZ kindling, anti-oxidants and brain antioxidant status revealed that such seizures were associated with enhanced lipid peroxidation and lowered antioxidant defense in the brain. Anticonvulsant effects *i.e.*, reversal of kindling behaviour was seen with the NO synthase inhibitor, L-NAME and 7-nitroindazole. Melatonin, a pineal hormone with antioxidant effects, synergized with the NO synthase inhibitors during anti-seizure effects in this model. These neuroprotective effects were associated with attenuations in the brain oxidative and nitrosative damage as measured by biochemical markers of lipid peroxidation (MDA), antioxidant defense (SOD and catalase) and NO metabolites (NOx). A comparison was done to evaluate the effect of NO modulators during stress and seizures, two correlated neurobehavioural paradigms, and was observed that NO precursor was neuroprotective during stressful situations but surprisingly worsened / aggravated the seizures in response to theophylline. These findings were well corroborated by the biochemical data of NO metabolite measurements in brain homogenates. Additional pharmacological studies were conducted using NO synthase inhibitors (*i.e.*, induction of NO depletion), and they also supported the differential role of NO in these situations.

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

The present study was designed to assess the effects of acute and chronic restraint stress (RS) on biological responses and to evaluate the pharmacodynamics of stress adaptation in experimental animals. The molecular basis of stress tolerance is of considerable importance for devising strategies for drug therapy in such situations. Acute stress induced behavioural suppression, enhanced corticosterone response and immunomodulation and NO modulators differentially influenced these changes. Further, cold restraint induced gastric ulceration was attenuated by NO mimetics and aggravated by NO depletors, in a consistent manner. The pharmacological and biochemical data show that NO may be involved in the cellular / molecular events resulting in stress tolerance. Repeated RS exposure attenuated acute stress responses and these were associated with parallel changes in plasma and brain NO metabolite (NOx) levels. Pretreatment with NO modulators also influenced these stress markers and also modulated the biochemical parameters studied. Additional studies with conventional anti-anxiety / anti-stress agents showed that there may be a possible interaction between NO and some of the classical neurotransmitters during stress. However, in chronic stress models, when rats were exposed to repeated RS (6hx10), the behavioural responses were completely abolished; corticosterone responses were erratic, whereas, MDA and NOx levels were further aggravated, as compared to the single RS (6h) group. Chronic stress also resulted in attenuation of the ulcerogenic response in mild stress situations (RS, 1hx10). In the severe RS group (RS, 6hx10) very severe gastric mucosal lesions were seen, suggesting that the adaptive mechanisms were broken down. This further supports the findings observed in behaviour and corticosterone responses during chronic severe RS. It is inferred that, both acute and chronic RS responses were differentially influenced by NO modulators. Such stressor intensity and duration dependent biological responses (neurobehavioural, endocrinal, immunological and gastric) are regulated by complex CNS mediated pathways and the brain-gut-immune axis and RNS-ROS interactions may be involved in this phenomenon.

Physiology

Research

1. Studies on the behaviour of RARs during high altitude exposure

The main objectives of this study were to look at the changes in airway rapidly adapting receptor (RAR) activity following high altitude exposure and see their responses to some (endogenous) chemicals in this condition. Adult rabbits weighing 2-3 kg housed in separate enclosures in the animal house of VPCI 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* exposed to the desired height and duration in a high altitude simulation chamber. RAR activity was recorded in both the groups.

Effect of substance P (SP) on baseline RAR activity

Group I (Control), (n= 5)

Substance P (doses: 0.02, 0.04 and 0.08 µg/kg) produced a dose-dependent increase in RAR activity. However, the increase in RAR activity was significant only with the highest dose tested ($p<0.01$). Following the administration of the SP antagonist CP-96345, there was a gradual decline in the baseline RAR activity. On repeating the doses of SP, it was observed that there was a blunting in the responses of RARs to SP. Even then, there was a small but significant increase in the receptor activity with the highest dose of SP ($p<0.05$).

Group II (Acute exposure to high altitude), (n=5)

In this group of animals, there was a significant increase in the basal activity of the RARs. Substance P (doses: 0.02, 0.04 and 0.08µg/kg) produced a dose dependent increase in RAR activity. The RAR activity increased significantly with all the doses tested. Following the administration of the SP antagonist, CP-96345, there was a gradual decline in the basal RAR activity. On repeating the doses of SP, it was observed that there was a blunting in the responses of RARs to SP and the dose response curve was shifted to right.

These findings indicate that on exposure to high altitude, there is pulmonary congestion (evidenced by histological examination of portions of the lung) which stimulates the RARs accounting for the increase in basal activity of RARs. In this state, there is an exaggeration in the responses of RARs to SP administration. The SP responses are mediated by NK1 receptors. It is proposed that along with other mechanisms, SP may be contributing to pulmonary congestion. The results indicate that RARs may account for some of the respiratory symptoms observed in high altitude.

2. Studies on the responsiveness of airway rapidly adapting receptors (RARs) to cigarette smoke (CS) inhalations

The main objectives of this study were to investigate whether the RARs retain their ability to respond to acute cigarette smoke (CS) inhalation (3 puffs) in sensitised challenged animals with and without chronic CS inhalation for 27 days.

Adult rabbits of either sex, weighing 2-3 kg housed in separate cages at animal house of VPCI and provided with food and water ad libitum were used as experimental animals.

Chronic exposure to main stream cigarette smoke

Experimental animals were exposed to main stream CS from four cigarettes of a particular brand (Gold Flake) drawn into an exposure chamber with a capacity of 16 litres. The exposure period was1 hr / day, 7 days a week for 27 days; during the time of exposure air flow through the chamber was held constant. The exposure chamber was fitted with another small chamber containing soda lime for absorption of expired CO_2. Temperature of chamber was monitored by using thermometer. Control animals were delivered normal room air in identical fashion.

Acute cigarette smoke delivery

A "Y" connector was attached in series to the inlet of the ventilator. To one arm of the Y connector, a lighted cigarette was attached. The other arm open to the air was closed off so that during each ventilatory cycle, air was drawn through the cigarettes and the volume of air inhaled for each puff was equal to one tidal volume of the ventilator. Three minutes prior to the inhalation of CS, oxygen supplementation of inspired air was temporarily interrupted.

Airway sensitisation and challenge

Rabbits were systematically sensitised with ovalbumin (OVA) as described by Gabor Horvath *et al* (2002) with some modifications. On the 28th day during recording of RAR activity, they were challenged by inhalation of 0.1% solution of OVA for 1 min using an ultrasonic nebulizer. This group was referred as sensitised group.

Results and observations

Animals were divided into four groups (n=6, each). *Group I* (Control, exposed to normal room air for 27 days), *Group II* (Chronic CS exposed), *Group III* (Sensitised) and *Group IV* (Sensitised and chronic CS exposed).

On the 28th day, animals in each group were anesthetised and RAR activity was recorded. RAR activity was recorded for 25 breaths; the initial 5 breaths served as control and the next 20 breaths served as experimental period. Three puffs of CS (acute CS) were given from 6th breath onward for the next 3 breaths. The basal RAR activity in *Group I, II, III* and *IV* were 7.01±0.644, 10.67±1.50, 10.23±0.99 and 11.40±1.39 impulses / breath respectively. On exposure to 3 puffs CS in *group I,* the RAR activity increased to 14.74±0.27, with a peak discharge of 19.67±0.61 impulses / breath. In *Group II,* the RAR activity increased to 20.20±1.50, with a peak discharge of 25.33±1.11 impulses / breath. In *Group III,* the activity increased to 17.10±2.27, with a peak discharge of 20.11±2.76 impulses / breath. In *Group IV,* the RAR activity increased to 20.34±2.32, with a peak discharge of 23.67±2.70 impulses / breath. The percentage increase in mean RAR activity in *Group I, II, III and IV* were 118.4±17.22, 101±18.05, 65.54±10.08 and 80.88±9.05 respectively.

The results show that there is a significant increase in the basal RAR activity in *Group II, III and IV* when compared with *Group I* ($p<0.05$) suggesting that the RARs may mediate the airway defence reflexes associated with these situations. The results also show that on acute exposure to CS, even though stimulation of RAR in *Group I* was much higher compared to the other groups, the RARs retain their ability to respond to airway irritants. This behaviour of RAR may explain the exaggeration of respiratory reflexes in COPD and asthmatic patients when they are exposed to airway irritants.

Radiodiagnosis and Imaging

The Department continued to provide routine diagnostic services to the patients attending the Viswanathan Chest Hospital of the Institute. The Department consists of three units: *(i)* CT Scan Unit, *(ii)* Ultrasound Unit and (*iii)* X-ray Unit.

(i) CT Scan Unit

A total of 2287 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	1218
Head CT	11
PNS CT	945
Abdomen CT	03
CT guided FNAC	110
Total	**2287**

(ii) Ultrasound Unit

A total of 401 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	183
Abdomen USG	131
USG guided procedures	87
Total	**401**

(iii) X-Ray Unit

A total of 19449 X-ray examinations were done during the period as per the details given in Table 3. Out of a total of 19449 X-ray examinations made 13516 were done on PACS and 5933 were done on X-ray films.

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

Examination	Number
Total X-rays	**19449**
PACS*	
Chest X-ray (adult)	11933
Chest X-ray (child)	520
PNS X-ray	1063
Total PACS X-ray	**13516**
FILM X Ray	
Chest X-ray (adult)	4674
Chest X-ray (child)	862
PNS X-ray	397
Total Film X-ray	**5933**

*PACS**: Picture archiving and communication systems.

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

Respiratory Allergy and Applied Immunology

Research

1. Biochemical and clinico-immunologic characterisation of mosquito (*Culex quinquefasciatus*) allergens

Of the three major allergenic proteins identified in crude *Culex quinquefasciatus* (*Cq*) extract, one allergenic protein of 24 kd was purified to homogeneity. On subjecting this protein to SDS-PAGE only one protein band was obtained. Homogeneity of this purified protein was further confirmed by subjecting it to fast protein liquid chromatography (FPLC) using a pre-packed Mono-Q column which resulted in a single peak. Enzyme allergosorbent test (EAST) and EAST inhibition assays were developed for quantification of this purified protein in crude *Cq* extract. Dose-related inhibition was obtained in *Cq* EAST with the purified component as well as with the crude extract. Dose required for 50% inhibition of the crude *Cq* whole body extract (WBE) and the purified protein were calculated. Based on these results, the amount of this purified allergen in the crude *Cq* extract (1:20 w / v) worked out to be 465 µg / ml. It is recommended that this information may be considered as a parameter for the quality control of commercially available indigenous crude mosquito extracts used for the diagnosis and immunotherapy of mosquito allergic patients.

2. Identification, purification and characterisation of components of clinically important insect allergens implicated in allergic rhinitis and bronchial asthma

Skin Prick Tests (SPT) were performed on 200 patients suffering with bronchial asthma and / or allergic rhinitis with the whole body extract (WBE) of five common insects of Delhi area, namely cockroach (male), cockroach (female), mosquito, housefly and honey bee. The positive SPT response (1+ to 4+) in the 200 patients varied from 34.5% with honey bee to 43.5% with mosquito WBE. Markedly positive reactions (2+ to 4+) varied from 17.5% with honeybee to 27.5% with mosquito extract. Enzyme allergosorbent test (EAST) was performed to estimate allergen specific IgE in patients' sera. EAST positivity ranged from 60 % in cockroach (female) to 73.6 % in housefly with the sera of patients showing 1+ to 4+ cutaneous responses to these insects. All the 10 patients with negative SPT response to any of the insect extracts showed a negative EAST result. EAST performed with the solid phase insect extracts and normal human sera (n=15) were uniformly negative. For conducting inhibition assay, separate pools of patients' sera (PPS) were prepared by pooling equal volumes of sera of 20-25 patients with highly positive skin as well as EAST positivity to each insect WBE. A pool of sera from some non-allergic healthy subjects (PHS) was also prepared to serve as a negative control. A binding curve with PPS was generated and the amount giving an optimum binding (in the linear range) was determined and used for subsequent EAST inhibition assays. The extracts of cockroach (male), cockroach (female) and housefly induced dose related inhibition of homologous EAST, establishing the specificity of EAST. The amount of cockroach (male), cockroach (female) and housefly extracts required for 50% inhibition of homologous EAST was 251ng, 222ng and 214ng respectively.

3. Studies on aerobiological aspects, clinico-immunologic assessment of allergenic potential and biochemical characterisation of allergenic components of *Aspergillus* species

The allergenic significance of four *Aspergillus* species *viz*. *A. flavus, A. fumigatus, A. niger* and *A. tamarii* was studied by performing SPTs on 230 patients suffering with bronchial asthma and / or allergic rhinitis. Of the 920 SPTs performed with four *Aspergillus* extracts, 192 (20.9%) turned out to be positive (1+ to 4+), 127 (13.8%) being markedly positive responses (2+ to 4+). Skin test positivity varied from species to species. Allergen specific IgE was estimated in the patients' sera showing different grades of cutaneous response by performing EAST. Average EAST positivity was 70.8% in 1+ to 4+ cases. These results gave evidence that *A. flavus, A. fumigatus*, *A. niger* and *A. tamarii* may serve as important sources of inhalant allergens for patients suffering with IgE mediated allergic respiratory diseases. Allergenic proteins in different *Aspergillus* extracts were identified in immunoblot experiments. The number of allergenic proteins varied from species to species (*A. flavus*: 11, *A. fumigatus*: 12, *A. niger*: 5, *A. tamarii*: 17). The molecular weights of allergenic proteins of *A. flavus* , *A. fumigatus, A. niger* and *A. tamarii* were in the range of 13.3-98.6 kd, 18.3-96.7 kd, 34-81.5 kd and 13.3-81.5 kd, respectively. Major allergens of these four *Aspergillus* extracts have been identified as: *A. flavus*- 13.3, 34 and 37 kd; *A. fumigatus*- 18.2, 34, 82.7, 90 kd; *A. niger*- 49, 55.4, 81.5 kd and *A. tamarii*- 13.3, 23, 25, 34, 39.5, 43 kd. *Aspergillus* sensitive patients' sera demonstrated heterogeneity of IgE response to different allergenic proteins

Release of Training Manual on Allergy Testing and Pulmonary Function Testing at the "34th Workshop on Respiratory Allergy: Diagnosis & Management" held on 16th-19th February 2009.

Faculty and participating delegates of "34th Workshop on Respiratory Allergy: Diagnosis and Management" held on 16th-19th February 2009.

of the four extracts in EAST binding, EAST inhibition and immunoblot experiments. Crossed-EAST inhibition studies indicated the presence of shared allergens among *Aspergillus* species- *A. tamarii* and *A. flavus*; and *A. tamarii* and *A. niger*. Some allergens of *A. tamarii* were also present in two other fungal genera *i.e., Mucor* and *Penicillium*. Immunochemical quantification studies revealed the presence of *Aspergillus* derived allergen in the air of Delhi metropolitan area. There were day-to-day variations in the airborne *Aspergillus* allergen content.

4. Breath carbon monoxide concentration in cigarette and *bidi* smokers in Indian population

The objective of the study is to measure and compare the breath carbon monoxide (CO) level in cigarette and *bidi* smokers in India.

A total of 389 smokers (148 *bidi* smokers, 241 cigarette smokers) were included in the study. Breath CO was measured using portable breath CO analyser (Bedfont-England, Smokelyzer) and analysis was made comprising subject who had smoked less than five pack-years or more than five pack-years. The tobacco contents of different brands of *bidi* and cigarettes were also measured. Statistical analysis was done using Statistical Package for the Social Sciences (SPSS) software, student t test, Levene's test and Chi-square test.

A total of 389 smokers with an average age of 38.69±13.44 were studied. The average duration of smoking was 18.19±13.03 years. Average breath CO level was 15.62±7.03 ppm in smokers and 4.075±1.163 ppm in non-smokers. Average breath CO level was significantly higher in *bidi* smokers (18.88±7.67 ppm) compared to cigarette smokers (13.62±5.78 ppm) when total consumption of *bidi* / cigarette was more than five pack-years (P=0.002). Average tobacco content of bidi (216.8 mg) was significantly less than cigarettes (696 mg).

Bidi is equally or more harmful than cigarette smoking. One *bidi* equal to one cigarette may be used for calculating pack-year smoking.

5. Role of transbronchial lung biopsy (TBLB) in diagnosis of sarcoidosis – an Indian perspective

The true burden of sarcoidosis in India is not clearly known due to underreporting caused by its resemblance to tuberculosis. Role of Interventional pulmonology is important in diagnosis of sarcoidosis.

Thirty-five suspected cases of sarcoididosis were evaluated for final diagnosis. Clinical. physilogical, radiological, serological evaluantitions were done. Bronchial biopsy. transbronchial lung biopsy, transbroncial needle aspirations were done and diagnosis of sarcoidosis was established histopathologically.

Of the 35 patients evaluated, 54.3% patients were females. 25.7% of patients were misdiagnosed as tuberculosis before coming to our hospital. Cough was the most common presenting feature. Joint pains were seen in 25% of patients but continuous involvement was seldom seen. Clubbing was rare and end inspiratory crackles were present in 50% cases. Pulmonary function test showed restriction with impaired diffusion in 60% cases. The most common radiological feature was bilateral symmetrical higher lymphadenopaty. Transbronchial lung biopsy showed a diagnostic yield of 87.5%. There was no complication after the procedure.

Transbronchial lung biopsy is safe and needed for diagnosis of sarcoidosis and sarcoidosis is often misdiagnosed as tuberculosis in India.

6. Indoor air pollution and respiratory allergy

The objective of the study is to find out indoor air pollution RSPM (PM5) and its relation with respiratory allergy particularly in Delhi.

Indoor air pollution primarily due to SPM is an environmental concern of many cities throughout the world and it affects human health.

Indoor PM5 levels were measured using cyclone-attached handy air sampler (APM 810) with flow rate of 1 LPM (litre per minute) with 6-8 hours of sampling period (between 10 AM and 6 PM). Handy air sampler for indoor samples was placed at the centre or corner of the room with the inlet roughly 1 meter above the ground level. Indoor PM5 level was measured in Shadara (industrial area), Ashok Vihar (residential area) and Jagatpur (urban village) of Delhi.

Indoor PM5 level was measured in 211 houses. The mean level of indoor PM5 was 191.67+104.5 µg / m3 (25.25 to 505.05µg / m3). The mean level of PM5 was maximum in Shahadara followed by Ashok Vihar and

Jagatpur. 211 children were assessed in these areas and 18 children were diagnosed as asthmatic. The mean PM5 level was high where children were having bronchial asthma, upper respiratory tract infection (URTI) and rhinitis (p=0.001). PM5 level was high where there was environmental tobacco smoke. PM5 concentration was high where there was occupancy rate of more than four persons per room. PM5 (p=0.001) concentration was higher where the residents used coal, wood, kerosene or cow dung cake for cooking purpose, when compared with use of LPG. Indoor RSPM (PM5) is strongly associated with asthma, rhinitis, URTI in children of Delhi

7. Impact of environmental tobacco smoke and indoor air pollutants on respiratory allergy In childrens of Delhi

Environmental tobacco smoke is a major source of indoor air pollutants such NO_2, SO_2 and SPM, have now been recognised as a significant health problem in home and office. Pollution from environmental tobacco smoke, cooking fuel smoke, building material, industrial smoke, road dust, furnishing and biological agents are increasingly found to cause respiratory allergy in children.

The aim of the present study is to determine the association between environmental tobacco smoke and indoor air pollutants level and respiratory allergy in children of Delhi.

This study took place at Delhi, capital of India. The study areas were divided in nine locations based on the source of pollution such as industrial, residential and villages. Indoor SO_2, NO_2 and SPM were measured by using Handy Air Sampler (Low Volume Sampler). Demographic profiles and respiratory symptoms of children were collected by the help of predesign questionnaire. The clinical examination of children was carried out.

A total of 3456 children have examined of which 59.2% children were male and 40.8% female. 34.8% children were exposing by environmental tobacco smoke, 79.7% children's family members were smoked in front of children and 90.1% children's family members were aware about smoking affects their children. Diagnosis of asthma, rhinitis and upper respiratory tract infection (URTI) was made in 7.7%, 26.1% and 22.1% children respectively. Children exposed to environmental tobacco smoke were significantly associated with asthma, rhinitis and URTI in the children. The mean level of indoor SO_2, NO_2 and SPM were 4.60±5.66 $\mu g / m^3$, 30.70±23.95 $\mu g / m^3$ and 705.3±441.6 $\mu g / m^3$. The mean level of indoor SO_2, NO_2 and SPM was significantly high in the houses where environmental tobacco smoke was present in the houses.

The prevalence of asthma, rhinitis and URTI, and mean level of indoor SO_2, NO_2 and SPM is significantly high where environmental tobacco smoke was present in the houses. This study suggests that environmental tobacco smoke play a significant role to increase concentration of indoor air pollutants, and development of asthma, rhinitis and URTI in children in the developing countries like India.

8. An Indian experience of bronchoscopy in 284 patients

The aim of the study is to assess the role of bronchoscopy in diagnosis of respiratory diseases.

Two hundred-eighty-four patients underwent bronchoscopy. Apart from viewing bronchical tree, bronchial aspirate, bronchial biopsy, BAL and transbronchial lung biopsy was done where needed. It is a retrospective study spanning four years (2001-2005).

Analysis of 284 patients [107 (37.7%) female and 177 (62.3%)] male) subjected to bronchoscopy for diagnostic purpose was undertaken. Mean age was 43 years (10-83 years). History of cough was present in 177 (62.3%), breathlessness in 136 (47%), fever in 71 (25%) and haemoptysis in 37 (13%). X-ray chest revealed non-homogenous / homogenous opacity, reticular opacity, cystic shadow, cavity, pleural effusion. CT scan of thorax showed fibrosis, bronchiactesis, mass lesion, ground glass appearance, collapse, cavities, lymphadenopathy, honeycomb lung, pleural effusion, cystic area, consolidation, clacified lesion, necrotic mass, apical bullae, etc. Bronchoscopic findings revealed mucosal congestion, mucosal plaque, fibrosis, area of narrowing, mucous plugging, mass lesion, nodules, etc. Bronchial aspirate was done in all patients, which was positive for AFB (16), fungi (5), and pyogenic (11) infections. BAL was done in 25 patients. Infectious bronchial biopsy (76) revealed chronic nonspecific inflammation, granulomaous inflammation consistant to tuberculosis, sarcodisis, etc. Transbronchial lung biopsy was taken in 34 patients. Considering all factors diagnosis of ILD (132), sarcodisis (29), tuberculosis (37), pyogenic infection (6), and malignancy (24) was established.

On basis of reports, diagnosis of intestinal lung disease (11.2%), sarcodisis (10.2%), tuberculosis (13%), pyogenic infection (2.1%) and malignancy (8.4%) was established. Bronchoscopy plays an important role in establishing diagnosis in respiratory diseases.

9. Prevalence of bronchial asthma and association with environmental tobacco smoke exposure amongst girl school-children in Delhi, India

The present study was carried out to estimate the prevalence of asthma in urban children in India. The study was done on girl students of a convent school in New Delhi, India.

It was questionnaire based study, which were distributed to all the children present (2139) to be answered by either parent. The key questions based on ISAAC questionnaire were related to complaints of wheezing, cough or dyspnoea in the last one year and also these symptoms exclusively induced by exercise or colds.

Two thousand one hundred and thirty-seven questionnaires were returned (response rate 99%). The prevalence of current asthma was found to be 7.7% based on the questionnaire. This was objectively confirmed by clinical examination and spirometry which was 5.1%. Prevalence of allergic rhinitis was found to be 19.2%. Exclusive exercise induced asthma was seen in 1.9%. There was significant association between family history of smoking (P=0.0006) and exposure to environmental tobacco smoke (P=0.04) in asthmatic subjects. The prevalence of asthma is quite high in school children in Delhi and is comparable to previous reports from India and developed countries. Environmental tobacco smoke is positively association with prevalence respiratory symptoms.

10. Effect of glycemic control on outcome of acute exacerbation of COPD

Previous studies have shown that in hospital mortality from acute exacerbation of chronic obstructive pulmonary disease (AECOPD) is predicted largely by factor such as older age, male sex, co-morbidity and arterial pH but not much is known whether a remediable factor like hyperglycemia predicts outcomes of hospitalisation during AECOPD. There are not many studies to see the beneficial effect of tight glycemic control, if any, in patients with AECOPD. The study was undertaken to see the effect of glycemic control on length of hospital stay in patients with AECOPD.

Fifty-two patients in AECOPD were enrolled after taking informed consent, in the inpatient department of V.P. Chest Institute. All baseline investigations were carried out and patients were categorised as euglycemic (n=18), hyperglycemic on multiple dose insulin (MDI) therapy (*i.e.*, insulin group, n=16), and hyperglycemic on oral hypoglycemic (OHA) therapy (*i.e.*, OHA group, n=18) after randomisation of hyperglycemic patients. All patients of AECOPD were treated as per GOLD guidelines, and those with hyperglycemia with either OHA or MDI therapy.

There was no significant difference in age, sex, grades of dyspnoea and GOLD staging of COPD between groups. Duration of hospital stay was in range of 3-21 days in all 52 patients (6.29 $\pm$3.10); in euglycemic group 3-10 days (5.22 $\pm$ 2.02), in insulin group 3-11 days (6.00$\pm$2.03) and in OHA group it ranged from 3-21 days (7.61$\pm$4.24). There was significant difference in hospital stay between euglycemic and OHA group, (P=0.041). There was no significant difference between euglycemic and insulin group.

The duration of the hospital stay in patients with AECOPD and diabetes mellitus treated with OHA was higher than with AECOPD alone, and hospital stay can be reduced with use of insulin instead of OHA in such patients.

11. Impact of smoking on treatment outcome in bronchial asthma patients

There are important interactions between smoking and asthma. It is already appreciated that cigarette smoke has immunomodulatory properties, but it is unknown in what way cigarette smoking may alter airway immunity in asthma and how this might be associated with an impaired steroid response and increased asthma severity. Both morbidity and mortality from asthma are increased in individuals who are cigarette smokers compared with neversmokers. Asthmatic smokers have more severe asthmatic symptoms, greater need for rescue medication 15 and worse indices of health status when compared with neversmokers.

A total of 64 subjects were enrolled for the study, and these were stratified into four groups; *Group 1*= bronchial asthma with smoker, *Group 2*= bronchial asthma without smoking history, *Group 3*= healthy non-

smoker control and *Group 4*= healthy smoker. Before enrolment into the study, smokers were counselled to quit smoking, and those who denied were enrolled in the study. After thorough examination of all the four *Groups* important laboratory investigations including haemogram, chest X-ray, X-ray PNS, and skin prick test against common aeroallergen were done in all the four groups. Exhaled nitric oxide (FENO) and hsCRP level was measured in all the four *Groups*. *Group 1* and *Group 2* patients were then given questionnaires (ACQ & AQLQ) and the respective scores were assessed. After doing PFT, *Group 1* and group 2 entered the treatment period of six weeks. The patients were given a symptom diary and a drug diary, to ensure compliance, and to know about their daily symptoms, and were called every two weeks. Statistical analysis was done using SPSS 14.0 version and Graph pad 4.02 version.

Bronchial asthma with smoker had neutrophilic predominance in their blood picture, and their was highly significant difference in the neutrophil percentage between the *Group 1* and *Group 2*, with bronchial asthma with smoker group having significantly higher neutrophilic percentage as compared to their non-smoking counterpart. *Group 2* had significantly high eosinophil count as compared to their smoking counterparts. Mean FEV_1, FVC and % predicted values between the two groups were comparable without any significant difference. Mean FENO was highest in asthmatic without smoking history group, followed by healthy control, then asthma with smoker and was lowest in healthy smoker. Mean hsCRP level was highest asthmatic smoker group followed by asthmatic non-smoker, healthy smoker and was lowest for healthy control. ACQ score was lower in non-smoker asthmatic as compared to smoker asthmatic AQLQ score was higher in non-smoker asthmatic as compared to smoker asthmatic. After a treatment period of six weeks, non-smoker asthmatic showed statistically significant improvement in all the measured indices of PFT, while smoker asthmatics showed improvement only in prebronchodilator FEV_1, and % predicted prebronchodilator FEV_1. Mean FENO of non-smoker asthmatic group was significantly reduced after treatment, while in their smoking counterparts, the post-treatment FENO was non-homogenous in distribution. However, mean FENO of the smoker asthmatic group increased after treatment. Both the groups showed fall in mean hsCRP after six week of treatment, non-smoker asthmatics have much lower level of mean hsCRP after treatment as compared to their smoking counterparts. Though both group showed better asthma control and better quality of life after treatment, asthma control and quality of life was much better in non-smoker asthmatic group.

Also, we would like to conclude here with the words that, the underlying pathology in smoker asthmatic is different from non-smoker asthmatic, as evident in our all of the measured parameters. These finding suggests that alternative antiinflammatory treatment may be required for this group of patients. Furthermore, our study serves to emphasise the importance of smoking cessation in asthma.

12. Evaluation of high sensitivity C reactive protein in patients of bronchial asthma and its correlation with exacerbation rate and pulmonary function

C reactive protein (CRP) is an inflammation sensitive plasma protein which is a marker of systemic inflammation in bronchial asthma. The objective of the study was to evaluate high sensitivity CRP (hs-CRP) as a predictor of exacerbation in bronchial asthma by correlating it with exacerbation rate and FEV_1. hs-CRP and FEV_1 was assessed in 64 patients of severe bronchial asthma during remission. The number of exacerbations was assessed over 10 months (March to December). hs-CRP and FEV_1 were repeated during exacerbations or at end of study.

A total of 53 exacerbations were observed in the study group (mean$\pm$SD = 0.828$\pm$0.79). hs-CRP level during remission (CRP_Rem) was 1.719$\pm$1.43. There was partial positive correlation between CRP_Rem and exacerbations ($r=0.763$, $p<0.01$). hs-CRP levels was seen to rise (1.525$\pm$1.90, $p<0.01$) and FEV_1 decrease during exacerbations (0.735$\pm$0.45, $p<0.01$). hs-CRP and FEV_1 showed partial negative correlation during remission ($r=-0.5$, $p<0.01$) and during exacerbations ($r=-0.2$, $p>0.05$).

Of the study population, in those with hs-CRP<1 during remission (n=29) there were 7 exacerbations (0.241$\pm$0.43), CRP_Rem was 0.465$\pm$0.28. In subjects with hs-CRP of 1-3 (n=20) 21 exacerbations were seen (1.05$\pm$0.61), CRP_Rem was 1.94$\pm$0.65. In those with hs-CRP>3 (n=15) there were 25 exacerbations (1.666$\pm$0.62) with CRP_Rem of 3.847$\pm$0.50.

Significant positive correlation of hs-CRP with exacerbation rates and significant negative correlation of hs-CRP and FEV_1 are seen during remission. Thus, hs-CRP levels during remission may be used as a marker for predicting future exacerbations in asthmatics.

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. Allergic rhinitis: *Aspergillus* sensitisation increases the severity of sinusitis in "blockers" as compared to "sneezers and runners"

Allergic rhinitis (AR) can be categorised as sneezers-runners and blockers. We sought to determine the occurrence of sinusitis in these two categories and the effect of *Aspergillus* sensitisation.

Consecutive skin test positive patients with AR, categorised into sneezers-runners and blockers as per Allergic Rhinitis and its Impact on Asthma (ARIA) guidelines, were analysed for *Aspergillus* sensitivity. Total serum IgE levels and serum precipitins against *Aspergillus* antigens were done. Computed tomography of the paranasal sinuses (CT-PNS) was done and extent of sinusitis was staged.

Of the 131 patients, 79 (60%) were sneezers-runners and 52 (40%) blockers. Sinusitis occurred in 88 / 131 (67%) patients, of whom 41 were sneezers-runners while 47 blockers. Sinusitis was significantly higher in blockers (47 / 52 *vs* 41 / 79, P = 0.045). Skin test reactivity to *Aspergillus* antigens was seen in 32 (24%) patients. This was significantly higher in those with associated sinusitis (28 / 88 *vs* 4 / 43, P=0.02). *Aspergillus* sensitisation was significantly higher in blockers as compared to sneezers-runners (23 / 52 *vs* 9 / 79, P=0.001). Precipitins against *Aspergillus* antigens were positive in 12 (9%) patients, of whom 9 (17%) were blockers while 3 (4%) were sneezers-runners. Number of patients with eosinophilia was significantly higher in sneezers-runners with sinusitis as compared to those without (22 / 41 *vs* 8 / 38, P=0.042). In *Aspergillus* positive blockers with sinusitis, number of patients with eosinophilia was significantly higher as compared to *Aspergillus* negative blockers with sinusitis (8 / 20 *vs* 2 / 27, P=0.03). CT-PNS scores too were significantly higher in *Aspergillus* positive blockers with sinusitis as compared to the *Aspergillus* negative (4.570.4 *vs* 3.871, P=0.001). Mean number of sinuses involved were also significantly higher in *Aspergillus* positive blockers with sinusitis as compared to the *Aspergillus* negative (4.670.2 *vs* 3.872, P=0.001). However, there were no significant differences in CT-PNS scores and number of sinuses involved in *Aspergillus* positive sneezers-runners with sinusitis as compared to the *Aspergillus* negative. Total IgE was significantly higher in *Aspergillus* positive blockers with sinusitis as compared to the *Aspergillus* negative (1315.7889 *vs* 798.7754, P=0.048). Two blockers were confirmed as allergic *Aspergillus* sinusitis.

Sensitisation to *Aspergillus* antigens is significantly higher in blockers with sinusitis. Sensitisation also increases the severity of sinusitis associated with AR.

2. Frequency of familial occurrence in 164 patients with allergic bronchopulmonary aspergillosis

Asthma is known to run in families. Allergic bronchopulmonary aspergillosis (ABPA) occurs predominantly in patients with asthma. However, there are only six reports of familial occurrence over a period of 35 years. To determine the frequency of familial occurrence in 164 patients with ABPA diagnosed over a period of 22 years in one unit.

One hundred sixty-four patients with ABPA were reviewed for the occurrence of familial ABPA. Symptomatic family members were evaluated for the presence of ABPA as well as allergic *Aspergillus* sinusitis (AAS). Allergic bronchopulmonary aspergillosis and AAS were diagnosed as per criteria established.

Of the 164 patients with ABPA, familial occurrence was detected in 4 pairs of first degree relatives, 2 of whom were parent–child while the other 2 were siblings. Familial ABPA was seen in 4.9% of the total patients. Of these 8 patients seven had symptoms of rhinitis while 4 had sinusitis confirmed on computed tomography of paranasal sinuses. Allergic *Aspergillus* sinusitis was detected in 3 of these 4 patients. The fourth patient with sinusitis did not consent to surgery required to confirm the diagnosis. Five of our 8 patients, prior to referral, had received antituberculous therapy. All patients responded favourably to oral prednisolone.

Familial occurrence was documented in 4.9% of the 164 patients with ABPA.

3. Assessment of severity of disease in patients with allergic rhinitis when categorised as "sneezers and runners" and "blockers"

Patients with allergic rhinitis (AR) can be categorised as "sneezers and runners" and "blockers" depending upon their predominant symptom with both groups having different clinical and epidemiological profiles.

Consecutive AR patients diagnosed as per Allergic Rhinitis and its Impact on Asthma (ARIA) guidelines were enrolled and categorised into "sneezers and runners" and "blockers" as per their predominant symptoms. All patients underwent skin prick testing with 60 common aeroallergens and total serum IgE measurement along with computed tomography paranasal sinuses (CT PNS) for evaluation of sinusitis. Symptom severity was measured using a visual analog scale (VAS) ranging from 0 to 10 cm while quality of life (QoL) was assessed using 'Sino-Nasal Outcome Test-22' (SNOT-22) questionnaire assessing symptoms related to both nose and general health.

A total of 134 patients with skin test positive AR was enrolled. Of the 134 patients, 85 (63.4%) were "sneezers and runners" while 49 (36.6%) were "blockers". Significantly more "sneezers and runners" lived in rural areas (19/85 *vs* 5/49 p = 0.043), had poor ventilation at home (22/85 *vs* 4/49, p=0.012), larger average number of sneezes per episode (8.99±3.52 *vs* 3.71±3.29, p<0.001) as well as more number of episodes per day (5.71±2.07 *vs* 2.53±2.29, p<0.001), watery nasal discharge (51/85 *vs* 10/49, p<0.001), nasal itching (69/85 *vs* 21/49, p<0.001), associated eye itching (63/85 *vs* 24/49, p=0.003), watering of eyes (66/85 *vs* 23/49, p<0.001), palatal and throat itching (53/85 *vs* 19/49, p=0.008), skin allergy (20/85 *vs* 2/49, p=0.003). More patients experienced aggravation of symptoms on exposure to pollens (33/85 *vs* 9/49, p=0.014), feathers and furs (30/85 *vs* 6/49, p=0.010) and perfumes (28/85 *vs* 6/49, p=0.008). On the other hand "blockers" had significantly more thick nasal discharge (16/49 *vs* 7/85, p<0.001), post nasal drip (44/49 *vs* 59/85, p=0.018), significant loss of smell and/or taste (20/49 *vs* 14/85, p=0.002), mouth breathing (36/49 *vs* 28/85, p<0.001). "Sneezers and runners" had significantly higher total IgE as compared to "blockers" (755.29±1059.65 *vs* 460.16±633.17, p=0.046). Skin prick testing with common aeroallergens showed that "sneezers and runners" had significantly higher sensitisation to seasonal aeroallergens *viz. Kigelia* (23/85 *vs* 4/49, p=0.009), *Salvadora* (28/85 *vs* 7/49, p=0.018) and *Candida* species (18/85 *vs* 2/49) while in "blockers" significantly more patients had sensitivity to perennial aeroallergens including house dust (27/49 *vs* 30/85 p=0.026), house dust mite (29/49 *vs* 28/85 p=0.003) and *Aspergillus* species (15/49 *vs* 8/85 p=0.002). On categorisation as per ARIA workshop report it was found that significantly more patients in "sneezers and runners" group had "moderate severe intermittent disease" (40/85 *vs* 2/49, p<0.001) as well as seasonal allergic rhinitis (64/85 *vs* 18/49, p<0.001) while "blockers" had more of "mild persistent disease" (26/49 *vs* 16/85, p<0.001) as well as perennial allergic rhinitis (28/49 *vs* 19/85, p<0.001). Symptom severity assessment of patients in two groups using VAS showed that "sneezers and runners" had significantly higher scores (6.57±2.09 *vs* 5.04±2.04, p<0.001). On evaluation of VAS for individual symptoms it was found that "sneezers and runners" have more severe symptoms of nasal itching (3.38±2.36 *vs* 1.00±1.44, p<0.001) and ocular symptoms (3.97±2.97 *vs* 1.91±2.64, p<0.001) as compared to "blockers" who had more severe symptoms of post nasal drip (5.316±2.66 *vs* 3.66±3.00, p=0.002), breathlessness (3.01±2.49 *vs* 1.85±2.09, p=0.005) and mouth breathing (3.42±2.27 *vs* 1.77±2.43, p<0.001). QoL assessment using SNOT 22 questionnaire showed that QoL was significantly more impaired in "sneezers and runners" with a higher mean SNOT 22 score (1.95±0.47 *vs* 1.65±0.64, p=0.002). On comparing the scores of individual parameters in the SNOT 22 questionnaire, we found that "sneezers and runners" complained significantly more of the need to blow their nose (2.87±1.18 *vs* 1.89±1.21, p<0.001), episodes of more nocturnal awakenings (1.65±1.23 *vs* 1.10±1.22, p=0.013), lack of good night's sleep (1.71±1.22 *vs* 1.24±1.29, p=0.037), reduced concentration (2.43±1.24 *vs* 2.04±1.18, p=0.023), reduced productivity (2.43±1.20 *vs* 1.91 ±1.25, p=0.032) along with having more frustration, irritation and restlessness due to their disease (2.64±1.25 *vs* 2.04±1.18, p=0.007). On the other hand, "blockers" had significantly more trouble due to loss of smell or taste sensation (1.20±1.20 *vs* 0.61±0.98, p=0.003), post nasal drip (3.18±1.13 *vs* 2.02±1.51, p<0.001) and facial pain or pressure (2.14±1.30 *vs* 1.67±1.09, p<0.027).

Patients of AR when categorised as "sneezers and runners" and "blockers" have distinct clinical profiles and distribution of various symptoms in two groups along with distinct allergen sensitivity profile. Further, "sneezers and runners" have more severe disease as analysed using a VAS scale and more impaired QoL as compared to "blockers".

Respiratory Virology

Research

1. Epidemiological study and genetic diversity of PB1-F2 gene in influenza A virus isolates

The PB1-F2 gene is a novel protein which was first identified in influenza virus A/ Puerto Rico/ 8/34/ H1N1 strain. It is called PB1-F2 because it is translated from an alternative open reading frame (ORF) in the PB1 gene. It has been shown to play a role in the down-regulation of the host immune response to the viral infection. It localises to mitochondria, permeabilizes and destabilises the phospholipid bilayer membrane, thereby leading to macromolecular leakage, and finally apoptosis.Currently, it has also been found that PB1-F2 gene is under the highest positive selection pressure for non-synonymous substitutions.

The study involves isolation of influenza A viruses from the clinical specimens obtained from the patients of upper respiratory tract infection from the hospitals in Delhi. A total of 131 specimens have been collected till date (68 nasal swabs, 46 throat swabs, 7 nasopharyngeal aspirates, and 10 either nasal or throat swabs). Further, the RNA from positive isolates was extracted using Qiagen RNeasy kit and amplified for the PB1-F2 gene using Qiagen RT-PCR kit. The primers for PB1-F2 gene has been synthesised PCR will be performed to check the presence of PB1 F2 gene in particular isolate. The amplified gene will be used for DNA sequencing and finally for phylogenetic analysis to assess their genetic diversity. The study is continuing in our Laboratory.

2. Combinatorial antiviral approach against influenza A virus using ribozyme and siRNA

A multi target approach is needed for effective gene silencing for RNA viruses that combines more than one antiviral approach. Towards this end, we designed a wild type (wt) chimeric construct that consisted of small hairpin siRNA joined by a short intracellular cleavable linker to a known hammerhead ribozyme, both targeted against M1 genome segment of influenza virus. When this wt chimeric RNA construct was introduced into a mammalian cell line, along with the M1 substrate encoding DNA, very significant (67%) intracellular down regulation in the levels of target RNA was observed. When the siRNA portion of this chimeric construct was mutated keeping the Rz region unchanged, it caused only 33% intracellular reduction. On the contrary, when only the Rz was made catalytically inactive, keeping the siRNA component unchanged, about 20% reduction in the target M1-specific RNA was observed. This wt chimeric construct showed impressive (>80%) protection against virus challenge, on the other hand, the selectively disabled mutant constructs were less effective. Thus, in this proof of concept study we show that varying levels of protection against virus challenge was observed with novel mutant versions of the chimeric constructs.

3. Multi-site monitoring of human influenza viruses in India Phase-I

A surveillance effort is being implemented that monitors the antigenic changes of influenza virus isolates in India. Our major research objective is to detect new and potentially dangerous strains of influenza at the earliest moment so that measures can be enacted in the event of a pandemic. Antigenic variation occurs primarily in the HA and NA glycoproteins and results in recurrent epidemics of influenza, thus, making it necessary to continuously study the recent variants, so that vaccines can be prepared accordingly.

The surveillance project has been successfully running since last 2.5 years. One thousand sixty nine (1069) specimens were collected between the periods 15th Sept. 2006 to 31st March 09 from OPD/IPD of three hospitalsKalawati Saran Children's Hospital (KSCH), New Delhi, Chacha Nehru Bal Chikitsalaya (CNBC), Delhi and Lok Nayak Jai Prakash (LNJP) Hospital, New Delhi, in Delhi region. All the clinical specimens are inoculated in MDCK cell lines after processing of the specimens. Out of 1069 clinical specimens thirty one specimens were found positive for the flu virus in which 4 were H1N1, 13 were H3N2 and 14 were Flu B. Positive isolates were typed and sub-typed by HAI, RT PCR and IFA technique.

In case of Kalawati Saran Children's Hospital (KSCH), New Delhi, a total of 539 specimens were collected in which the patients with symptoms of ILI was found to be the maximum in the age group of 0-5 Yrs (438), 6-10 Yrs (79), 11-15 Yrs (18) and least in the age group of 16-20 Yrs (4). In case of LNJP, Delhi, out of 366 specimens, a similar pattern was observed with the maximum in the age group of 0-5 Yrs (220), 6-10 Yrs (124)

and least in the age group of 11-15 Yrs (22) while in case of CNBC, Delhi, out of 164 specimens, the patients with symptoms of ILI was found to be the maximum in the age group of 0-5 Yrs (127), 6-10 Yrs (33) and least in the age group of 11-15 Yrs (4).

Out of all the clinical samples collected form three hospitals, the numbers of virus isolates were maximum in the age group of 0-5Yrs (24) than in 5-10 Yrs (6), and least in the age group 11-15 Yrs (1) with the total overall virus isolation rate of 2.9 %. Male patients were found to be more susceptible than females in the ratio of 5.2:1 (26 M & 5 F).

The peak season for the isolation was found to be between November to February and between July and august. According to the meteorological data, influenza virus isolation rate increases as the temperature decreases, humidity increases and in rainy season. The data indicates that Influenza A and B are co-circulating in the community with characteristic marked seasonality.

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

The RNA segment 7 of influenza A and B viruses encodes the membrane protein, M 1, 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. Thus, the major objective of this research work is the post transcriptional gene silencing of M2 ion channel on influenza virus to inhibit its replication. The genes to be targeted are already PCR amplified after standardisation. These amplified genes are cloned in pGEMT vector and then sub-cloned in an expression vector pSec Tag 2A. The catalytic nucleic acids are already designed and sent for synthesis to manufacturers. The effect of these catalytic nucleic acids for Influenza virus replication inhibition is yet to be analysed. The study is continuing in our laboratory.

5. Study of viral replication inhibition by down regulation of NS1 gene of influenza A virus

The NS1 gene of Influenza A viruses is the only non-structural gene encoded by Segment 8 of the negative strand segmented genome of influenza. It has been proposed that NS1 gene product performs several regulatory functions during the viral replication cycle. The NS1 protein inhibits export of poly A containing mRNAs from the nucleus, giving preference to the viral RNA transport. It also seems to inhibit splicing of pre mRNA by binding to the stem bulge region of U6 small nuclear RNAs (snRNAs). In addition it suppresses interferon response in virus infected cells leading to unimpaired viral replication. Thus, knowing the probable role of NS1 gene in promoting viral replication; we are trying to inhibit this gene by using RNAi phenomenon.

The viral replication inhibition is being studied using siRNAs targeted against the conserved regions of the NS1 gene of influenza A virus. We have amplified NS1 gene successfully using gene specific primers. For this, initially, the RNA of A/PR/8 was isolated using Qiagen RNA Isolation kit and then one step PCR was done using gene specific primers. The, amplified NS1 gene has been cloned in p-GEMT easy vector, screened for positive clones in p-GEMT, restriction digested and finally cloned in pSecTag2A, the expression vector that allows expression of the gene product. Further siRNAs have been designed based on certain available programme (siDIRECT and M Fold) that provide predicted structures for effective siRNA against the targeted gene. The study is continuing in our laboratory.

6. 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. The viral genome keeps mutating but 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. The oligo corresponding to the conserved epitope of the M1 gene of influenza virus was amplified using suitable primers and cloned in a mammalian expression vector *viz.* pSecTag2B. The oligo corresponding to the protein transduction domain (PTD) of Tat of HIV was also amplified and inserted downstream to the previously cloned M1 epitope under the same promoter. The recombinant vector was sequenced to confirm the sequence and orientation of the

oligos. It was followed by expression of the recombinant vector in *E.coli* (BL-21 strain) and in the CHO K1 cell line. The expressed protein was isolated and purified using Ni-NTA Agarose column and was sequenced. Bone marrow was isolated from mice femur and cultured in RPMI containing 10% FCS and antibiotics. The bone marrow cells were made to differentiate into dendritic cells by adding GM-CSF and IL-4 into the media. Dendritic cells were further purified by MACS using cd11c magnetic beads and the culture was maintained RPMI media. The pure culture of dendritic cells is being sensitised with the purified epitopic proteins by incubating them with proteins.

7. Detection of human influenza virus by loop mediated isothermal amplification test (LAMP Test)

The detection and diagnosis of influenza virus has been carried out using conventional methods and by conventional PCR of the HA gene. A new and more sensitive method termed as LAMP Test is being standardized in the lab for typing and sub-typing of the virus present in the clinical samples of Delhi region. Two sets of primers including forward primer, reverse primer, internal forward and internal reverse primers have been designed for amplification of the hemagglutinin gene of the H1 and H3 strains. The viral RNA isolated from the clinical samples and PCR will be performed at a constant temperature and the bands obtained will be analysed and compared with the control bands of each strain. The study is in the process of standardisation.

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 2007-2009	Session 2008-2010
Dr Manju Batharia	Dr Krishna Pratap Singh
Dr Neelima Divakaran	Dr Ayush Gupta
Dr S. Vidya Nair	Dr Piyush Monoria
Dr Deepeish Gupta	Dr Saroj K. Meena
Dr Anuradha	Dr Avijit Bansal
Dr Praveen Kumar Thakur	Dr Anirudh Lochan
Dr Ananya Prabhu	Dr Shreeja Kumar
Dr Ashish Kumar Prakash	Dr Mahendra Nagar
Dr Shabd Prakash	Dr Anil Kumar Jaiswal
Dr Khriezovou Solo	Dr Gladbin Tyagi

MD Degrees (Awarded)

(Session: 2005-2008)

Name	Discipline
Dr Ankur Girdhar	Pulmonary Medicine
Dr Danish Jamal	Pulmonary Medicine
Dr Ramaraju Karthikeyan	Pulmonary Medicine
Dr Priyanka Aggarwal	Pulmonary Medicine
Dr Anjali Vinocha	Biochemistry
Dr Archana Angrup	Microbiology
Dr Gaurav Vishnoi	Pharmacology
Dr Payal Bhalla	Physiology

MD Theses (Submitted)

(Session: 2006-2009)

Sl No.	Name (Discipline)	Title of Theses	Supervisor(s)
1.	Dr Amit Kumar Lohia (Pulmonary Medicine)	Airway obstruction, bronchial hyper-reactivity and sensitivity to common aeroallergen in allergic rhinitis	Prof. S.N. Gaur
2.	Dr Avi Kumar (Pulmonary Medicine)	Occurrence of upper airway symptoms and their impact on quality of life (QoL) in patients with COPD	Prof. Ashok Shah
3.	Dr Kripesh Ranjan Sarmah (Pulmonary Medicine)	Factors affecting attainment of control in asthma	Prof. S.K. Chhabra
4.	Dr Nurul Haque (Pulmonary Medicine)	Effect of glycemic control on outcome of acute exacerbation of COPD	Prof. Raj Kumar and Dr V.K. Vijayan
5.	Dr Rajnish Kaushik (Pulmonary Medicine)	Evaluation of the effect of inhaled ciclesonide on the allergic and inflammatory markers in bronchial asthma	Dr Balakrishnan Menon and Dr V.K. Vijayan
6.	Dr Sant Ram (Biochemistry)	Studies on purification and characterisation of glutamine synthetase from *Mycobacterium smegmatis* with special reference to acetyl transferase activity	Prof. H.G. Raj and Prof. Mridula Bose
7.	Dr Jyoti Chaudhary (Microbiology)	Evaluation of polymerase chain reaction based detection of *Streptococcus pneumonia* in clinical samples and molecular characterisation of the culture isolates	Dr Malini Shariff, Prof. S.S. Thukral and Prof. Monorama Deb (V.M.M.C.& Safdarjung Hospital, New Delhi)
8.	Dr Mohammed Imran (Pharmacology)	Acute effects of tiotropium alone and in combination with formoterol in patients with COPD: comparision of three regimens	Dr Anita Kotwani, Dr V.K. Vijayan and Prof. S.K. Chhabra
9.	Dr Tripat Deep Singh (Physiology)	Obstructive sleep apnoea, oxidative stress and renal function	Prof. K. Ravi and Dr V.K. Vijayan

MD Theses (Submitted)

(Session: 2007-2009)

Sl No.	Name (Discipline)	Title of Theses	Supervisor(s)
1.	Dr Hemant Kalra (Pulmonary Medicine)	Pattern of infection in intensive care unit of Vallabhbhai Patel Chest Institute, Delhi	Dr V.K. Vijayan and Dr Malini Shariff
2.	Dr Sunil Kumar Pandita (Pulmonary Medicine)	Evaluation of systemic inflammatory markers, oxidant-antioxidant status and sputum cytology in stages of chronic obstructive pulmonary diseases	Dr B.K. Menon, Dr V.K. Vijayan and Dr Ritu Kulshrestha

MD Theses (Pursued)

(Session: 2007-2010)

Sl No.	Name (Discipline)	Title of Theses	Supervisor(s)
1.	Dr Ravi Shekhar Jha (Pulmonary Medicine)	The impact of smoking on treatment outcome in patients of bronchial asthma	Prof. Raj Kumar and Dr V.K. Vijayan
2.	Dr Nikhil Modi (Pulmonary Medicine)	Assessment of severity of disease in patients with allergic rhinitis when categorised as 'sneezers and runners' and 'blockers'	Prof. Ashok Shah
3.	Dr Rahul Roshan (Pulmonary Medicine)	A comparative evaluation of quality of life, dyspnoea, and lung function abnormalities in asthma and COPD	Prof. S.K. Chhabra
4.	Dr Sukanya Gangopadhyay (Biochemistry)	Studies on the role of lipids of lipid raft of erythrocyte membrane in COPD patients	Prof. S.K. Bansal and Dr V.K. Vijayan
5.	Dr Shivika Juneja (Microbiology)	A study of species spectrum of fungi causing systemic mycoses in HIV patients in a New Delhi Hospital and their antifungal susceptibility pattern	Dr Anuradha Chowdhary and Prof. Anil Gurtoo (LHMC, New Delhi)
6.	Dr Dushyant Lal (Pharmacology)	A comparative study of the efficacy and safety of theophylline and doxofylline in patients of obstructive lung disease	Prof. A. Ray, Dr V.K. Vijayan and Prof. Raj Kumar
7.	Dr Preeti Deep Singh (Physiology)	Autonomic modulation in asthma	Prof. M. Fahim and Prof. S.K. Chhabra

MD-Ist Year
(Session: 2008-2011)

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

PhD Awarded/Submitted

Sl No.	Name (Discipline)	Title of Theses	Supervisor(s)	Status
1.	Mr Ayanabha Chakraborty (Pharmacology)	Studies to explore gender related differences in stress responses with special reference on the role of nitric oxide	Prof. A. Ray and Prof. B.D. Banerjee (UCMS, Delhi)	Awarded
2.	Dr Swati Omnwar (Physiology)	Functional changes in vascular responsiveness following mercury exposure in rats	Prof. K. Ravi and Prof. M. Fahim	Awarded
3.	Ms Ruqiaya Nazir (Microbiology)	Effect of programmed cell death and cytokines induced by influenza A virus infection in allergic asthma: a study in murine model	Dr Madhu Khanna	Awarded
4.	Mr Rishi Pal (Pharmacology)	Experimental studies on the role of free radicals in emotional and environmental stress	Prof. A. Ray and Prof. B.D. Banerjee (UCMS, Delhi)	Awarded
5.	Ms Shwetambari Arora (Biochemistry)	Studies on acetoxy drug: protein tranacetylase in hypoxia induced pulmonary hypertension	Prof. H.G. Raj and Prof. Daman Saluja (ACBR, University of Delhi)	Submitted

PhD Theses (Pursued)

Sl No.	Name (Discipline)	Title of Theses	Supervisor(s)	Year of Registration
1.	Mr 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 poly-phenolic acetates as anti-tuberculous drugs	Prof. H.G. Raj and Prof. Mridula Bose	2005
2.	Mr Mohd. Adnan Kausar (Biochemistry)	Biochemical and clinico-immuno-logic characterization of mosquito (*Culex quinquefasciatus*) allergens	Prof. S.K. Bansal, Prof. M.K. Agarwal and Dr V. K. Vijayan	2005
3.	Ms Prachi Gupta (Biochemistry)	Lipid rafts in bronchial asthma: a study on membrane lipid metabo-lism in asthmatic patients	Prof. S.K. Bansal and Dr V. K. Vijayan	2005
4.	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)	2005
5.	Mr Neeraj Kumar (Biochemistry)	Molecular and biochemical basis of variation in clinical phenotypes of adrenoleukodystrophy	Prof. S.K. Bansal and Dr K.K. Taneja (IGIB, Delhi), Prof. Veena Kalra, Prof. Madhuri Behari (AIIMS, New Delhi), Prof. S. Aneja (LHMC, New Delhi)	2006
6.	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 hyper-sensitivity in guinea pigs	Prof. S.K. Bansal, Prof. S.K. Chhabra and Dr Ritu Kulshrestha	2006
7.	Ms Nivedita Priya (Biochemistry)	Studies on the development of anti-platelet candidate drug	Prof. H.G. Raj and Dr A.K. Prasad (Chemistry Deptt, University of Delhi)	2008

Sl No.	Name (Discipline)	Title of Theses	Supervisor(s)	Year of Registration
8.	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)	2004
9.	Ms Monika Sharma (Microbiology)	To study the effect of *Mycobacterium tuberculosis* infection of macrophages on T-cell viability	Prof. Mridula Bose and Prof. H.G. Raj	2004
10.	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)	2005
11.	Mr Neeraj Kumar Saini (Microbiology)	Functional analysis of mammalian cell entry (*mce*) proteins in mycobacteria	Prof. Mridula Bose	2006
12.	Ms Maansi Vermani (Microbiology)	Studies on aerobiological aspects, clinicoimmunologic assessment of allergenic potential and biochemical characterisation of allergenic components of *Aspergillus* species	Prof. S.S. Thukral, Prof. M.K. Agarwal and Dr V.K. Vijayan	2007
13.	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
14.	Ms Saakshi Pal Singh (Microbiology)	Studies on detection and characterisation of metallo-beta-lactamases in clinical isolates of *Pseudomonas aeruginosa*	Prof. S.S. Thukral and Dr Malini Shariff	2007
15.	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	2007
16.	Mr Rajesh Sinha (Microbiology)	Functional analysis of *mce1a* and *mce4a* gene of *Mycobacterium tuberculosis* H37Rv using over-expression approach	Prof. H.G. Raj, Prof. Mridula Bose and Dr A.K. Prasad (Chemistry Deptt., University of Delhi)	2008

Sl No.	Name (Discipline)	Title of Theses	Supervisor(s)	Year of Registration
17.	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
18.	Ms Rashmi Anand (Pharmacology)	Experimental studies on the role of opioids in stress and their interactions with nitric oxide in rats	Prof. A. Ray	2006
19.	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
20.	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	2008
21.	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	2005
22.	Ms Ruchi Bhagat (Physiology)	High altitude simulation on lung physiology and vagal afferent activity	Prof. K. Ravi and Dr Shashi Bala Singh (DIPAS, Delhi)	2007
23.	Mr Anirudh Vashisht (Physiology)	Behaviour of pulmonary vagal sensory receptors with myelinated afferents during free radicals induced airway hyperreactivity and its modulation by anti-oxidants in guinea pigs	Prof. K. Ravi, Prof. S.K. Chhabra and Prof. B.D. Banerjee (UCMS, Delhi)	2008

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

Sl No.	Name (Discipline)	Title of Theses	Supervisor(s)	Status
1.	Mr Prabhjot Singh (Biochemistry)	Studies on the enzymatic pro-pionylation of proteins and related biological effects	Prof. J. Gambhir (Deptt. of Biochemistry, UCMS, Delhi) and Prof. H.G. Raj	Pursued
2.	Ms Prija Ponnan (Computational Biochemistry)	*In silico* studies on structure, functions and application of a novel trans-acetyl-ase mediating protein acetylation independent of acetyl CoA	Prof. R.C. Rastogi (Chemistry Deptt, University of Delhi) and Prof. H.G. Raj	Pursued
3.	Ms Rashmi Tandon (Chemistry)	Studies on the antimycobacterial action of polyphenolic peracetates	Dr. Mahendra Nath (Chemistry Deptt, University of Delhi) and Prof. H.G. Raj	Pursued
4.	Mr Jitendra K. Nagar (Geology)	Suspended particulate matter enriched aerosol areas and its relationship with human health	Prof. J.P. Shrivastava (Geology Deptt, University of Delhi) and Prof. Raj Kumar	Pursued
5.	Ms Shipra Gupta (Med. Biochemistry)	Studies on isolation and mechanism of action of the antihyperglycemic and hypolipidemic 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	Pursued
6.	Ms Monika Joon (Microbiology)	Functional genomics of *mce* operons through the analysis of clinical isolates and knock out strains	Prof. Vani Brahmachari (ACBR, University of Delhi) and Prof. Mridula Bose	Pursued

Distinguished Visitors

- Dr Avtar Lal, Consultant, Drug Regulatory Agency, Health and Welfare, Govt. of Canada, Ottawa, Canada. Delivered a lecture entitled, "Role of Cardiac and Brain Rennin-angiotensin-aldostrone System in Cardiac remodelling and Dysfunction Post-Myocardial Infarction" (February 25, 2009).

- Dr D.A. Gadkari, Consultant, Influenza Surveillance Project, National Institute of Virology, Pune. Visited the Department of Respiratory Virology to inspect the facility and infrastructure for H1N1 influenza virus testing and has approved the same (August 20, 2008).

- Professor Om P. Sharma, Professor of Medicine, Division of Pulmonary and Critical Care Medicine, Department of Medicine, Keck School of Medicine, University of Southern California, 2025 Zonal Avenue, GNH 11-900 Los Angeles, CA 90033 USA and President of the World Association of Sarcoidosis and other Granulomatous Diseases. Delivered a lecture entitled, "Many Faces of Sarcoidosis" (November 24, 2008).

Awards/Honours

Dr V.K. Vijayan

- **President,** Indian College of Allergy, Asthma and Applied Immunology, Dehi (Up to December 2008).
- **President,** South Asian Association of Allergy, Asthma and Clinical Immunology.
- **Member,** Executive Council, University of Delhi.
- **Vice President,** World Lung Foundation-South Asia.
- **Member,** Executive Committee and Central Planning Committee, Asian Pacific Society of Respirology.
- **Chair,** Clinical Respiratory Medicine Assembly, Asian Pacific Society of Respirology.
- **Member,** Executive Committee, Tuberculosis Association of India.
- **Editor-in-Chief and Publisher**, *Indian Journal of Chest Diseases and Allied Sciences*, an official publication of the V.P. Chest Institute and the National College of Chest Physicians (India).
- **Member,** Editorial Advisory Board, *Chest*, an official publication of the American College of Chest Physicians, U.S.A.
- **Member,** Editorial Advisory Board, *Chest* (Indian Edition), an official publication of the American College of Chest Physicians, U.S.A.
- **Member,** Editorial Board, *World Allergy Organisation Journal*.
- **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, *Indian Journal of Tuberculosis*, an official publication of the Tuberculosis Association of India.
- **Member,** Editorial Board, *Lung India*, an official publication of the Indian Chest Society.
- **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,** 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, National Institute of Occupational Health (ICMR), Ahmedabad.
- **Member,** Scientific Advisory Committee, New Delhi Tuberculosis Centre, New Delhi.
- **Member,** Expert Committee, Project Review Group (PRG) for Indo–US Project Proposals in the Area of Environmental and Occupational Health, ICMR, New Delhi.
- **Expert Member,** Inter-departmental Review Panel, High Altitude Medical Research Centre (HAMRC), a joint venture between Defence Research and Development Organisation (DRDO) and Directorate General of Armed Forces Medical Services (DGAFMS).
- **Chairman,** Project Review Committee, Division of NCD in the field of Environment, ICMR.
- **Member,** Board for Updation of Curriculum in the Specialty of Pulmonary Medicine, Medical Council of India.

- **Chairman,** Sub-committee on UG and PG Examination Reforms, Faculty of Medical Sciences, University of Delhi.
- **Member,** Advisory Panel, National Academy of Medical Sciences (India) for election for award of Fellowship in the discipline of Respiratory Medicine- 2009.
- **Expert Member,** ICMR Expert Committee, for the assessment of Research Officer (Scientist B) and Senior Research Officer (Scientist C), Assistant Director / Assistant Director General (Scientist D) and Deputy Director / Deputy Director General (Scientist E) at NIOH for grant of promotions / advance increments.
- **Advisor,** Union Public Service Commission, New Delhi to select candidates for the post of Assistant Professor (Chest Medicine), (Specialist Grade II, Teaching Specialist Sub-cadre), JIPMER, Pondicherry.
- **Expert Member,** Selection Committee, Indian Institute of Toxicology Research under CSIR, Lucknow, for the post of Scientist Gr. IV(1).
- **Expert Member** of the committee to evaluate the suitability of the candidates for the ICMR award "Amrut Mody Unichem Prize (Chest Diseases).

Prof. M.K. Agarwal

- **President,** Indian College of Allergy, Asthma and Applied Immunology, Dehi (w.e.f. January 2009).
- **Editor,** *Bioscience Trends*, Published by International Research Cooperation Association for Bio and Socio-sciences advancement (IRCA-BSSA), Japan.
- **Member,** Editorial Board, *Indian Journal of Allergy, Asthma and Immunology*, an official publication of the Indian College of Allergy, Asthma and Applied Immunology.
- **Editor,** Biotechnology Society of India.
- **Member,** Vision Committee (VISION 2020), National Institute of Biologicals (NIB), Ministry of Health and Family Welfare, Government of India.
- **Member,** Scientific Advisory Committee, International Life Sciences Institute – India.

Prof. S.N. Gaur

- **Secretary,** South Asian Association of Allergy, Asthma and Clinical Immunology.
- **Secretary,** National College of Chest Physicians (India).
- **Member,** Asia and the Pacific Basin Region Committee and Autoimmunity, Anaphylaxis and Adverse Reaction to Food Allergy Committees, American Academy of Allergy, Asthma and Immunology.
- Awarded **Fellowship** of National Academy of Medical Sciences (NAMS).
- **Editor,** *Indian Journal of Allergy, Asthma and Immunology*, an official publication of the Indian College of Allergy, Asthma and Applied Immunology.
- **Expert Member**, Committee on Prevention, Abatement and Control of Pollution, Ministry of Environment and Forest, Government of India.
- **Appraiser,** DNB Course, National Board of Examination, New Delhi.
- **Expert,** Selection Committee, DNB Course, LRS Institute of Tuberculosis and Respiratory Diseases, New Delhi.
- **Expert,** Selection Committee, CSM Medical University, Lucknow, Uttar Pradesh for promotion of Professor in Pulmonary Medicine.
- **Member,** DOTS Plus Committee, DDG (TB), Government of India, New Delhi.

Prof. A. Ray

- **Member,** Editorial Board, *Indian Journal of Pharmacology*.
- **Member,** Editorial Board, *Journal of Pharmacovigilance and Drug Safety*.
- **Member,** Editorial Board, *Indian Journal of Allergy, Asthma and Immunology*, an official publication of the Indian College of Allergy, Asthma and Applied Immunology.
- **Member,** Advisory Committee, 16th World Congress of Basic and Clinical Pharmacology 2010 (WP-2010), Copenhagen, Denmark.
- **Member,** Institutional Ethical Committee, Rajan Babu TB Hospital, Govt. of Delhi, Delhi.

Prof. Mridula Bose

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

Prof. Ashok Shah

- **Editor**, *Indian Journal of Chest Diseases and 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.
- **Associate Editor,** *Indian Journal of Tuberculosis*, an official publication of the Tuberculosis Association of India.
- **Member,** Editorial Board, *European Respiratory Reviews.*
- **Member,** Editorial Board, *Clinical and Molecular Allergy*.
- **Member,** Editorial Board, *Open Allergy Journal.*
- **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, *Lung India*, an official publication of the Indian Chest Society.
- **Member,** Editorial Board, *Current Medical Trends.*
- **Member,** Selection Committee for Professor in the Department of Pulmonary Medicine at the Chhatarpati Shahuji Maharaj Medical University, Lucknow, Uttar Pradesh.
- **Member,** Technical Screening Committee, Biotech Consortium India Limited (BCIL).
- **Technical Member,** Purchase Board, Municipal Corporation of Delhi (Health Department) for the purchase of machines for pulmonary function testing.

Prof. S.K. Chhabra

- **Associate Editor**, *Indian Journal of Chest Diseases and 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.
- **Member,** Editorial Board, *Lung India*, an official publication of the Indian Chest Society.
- **Member,** Selection Committee, Recruitment and Assessment Centre, Defence Research Deveolpment Organisation, New Delhi.

- **Member**, Committee on Health Effects of Air Pollution, Central Pollution Control Board, Ministry of Environment and Forests, Government of India, New Delhi.

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,** Travel Grant Committee, University Grants Commission, New Delhi.

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.
- **Member,** Assessment Committee, Institute of Genomics and Integrative Biology, Delhi, for assessment of Group II and Group III Technical Staff.
- **Member,** Expert Panel, Council of Science and Technology, Lucknow, U.P. for evaluation of research proposal for grant-in-aid.

Prof. Raj Kumar

- **Treasurer,** South Asian Association of Allergy, Asthma and Clinical Immunology.
- **Member**, Editorial Board**,** *International Journal of Occupational and Environmental Health*, U.S.A.
- **Member,** Editorial Board, *Indian Journal of Chest Diseases and Allied Sciences*, an official publication of the V.P. Chest Institute and the National College of Chest Physicians (India).
- **Joint Secretary,** Indian College of Allergy, Asthma and Applied Immunology, Delhi.
- **Member,** Editorial Board, *Indian Journal of Allergy, Asthma and Immunology*, an official publication of the Indian College of Allergy, Asthma and Applied Immunology.
- **Member,** Project Review Committee, Department of Anthropology, University of Delhi, Delhi.
- **Member,** Review Committee on Genetic Manipulation, Department of Biotechnology, Government of India, New Delhi.
- **Expert Member,** Distance Education Department, Punjab Technical University, Jalandhar, Punjab.
- **Member,** Selection Committee, LRS Institute of TB and Respiratory Diseases, New Delhi, for the selection of Medical Officer.

Dr Mandira Varma

- **Awarded Best Paper Presentation** for the paper entitled, "*Identification of M. tuberculosis by PCR restriction analysis directly in clinical samples*" (by Mandira Varma-Basil, Garima Kushal, Rakesh Pathak, Kameshwar Singh, Shailendra Dwivedi, Sujeet Kumar, Bhawna Dhiman, Mridula Bose), presented at the 3rd Meeting of the Indian Association of Medical Microbiologists (Delhi Chapter), Delhi, December 6, 2008.

Dr Madhu Khanna

- **Expert Member,** Selection Committee, Dr B.R. Ambedkar Centre for Biomedical Research, University of Delhi, Delhi, for admission of PhD Programme.

Dr Anuradha Chowdhary

- **Awarded NAWOPIA-95 Dr Pankajalakshmi V. Venugopal Prize** for best paper in Mycology for a joint paper entitled, "*A study of species spectrum and antifungal susceptibility pattern of opportunistic*

pathogenic fungi isolated from HIV patients in New Delhi" (S. Juneja, Anuradha Chowdhary, H.S. Randhawa, G. Sundar, B. Sharma, A. Gurtoo), presented at XXXII Annual Congress of Indian Association of Medical Microbiologists (IAMM), Armed Forces Medical College, Pune, October 21-25, 2008.

Dr Anita Kotwani

- **Project Member and Country Coordinator**, WHO-HAI project on Medicine Prices.
- **Executive Member,** International Society for Pharmacoeconomics and Outcome Research (ISPOR), Indian Chapter.
- **Convener** for revision of B.Sc (Hons) Biomedical Sciences Course, University of Delhi, Delhi.
- **Member,** Committee of Courses and Studies for Honours, Postgraduate and Research Studies in Biomedical Sciences, Dr B.R. Ambedkar Centre for Biomedical Research, University of Delhi, Delhi.

Dr Kavita Gulati

- **Executive Member,** Indian Pharmacological Society.
- **Judge,** for prize in a scientific (poster) session in the 41st Annual Indian Pharmacological Society Conference, New Delhi.

Dr Vishal Bansal

- **Awarded** Membership of National Academy of Medical Sciences (MNAMS).

Dr Rajinder Bajaj

- **Member**, Animal Ethics Committee, Department of Biosciences, Jamia Millia Islamia, New Delhi.
- **Member**, Animal Ethics Committee, Institute of Genomics and Integrative Biology, Delhi.

Dr Avi Kumar (MD Student)

- Received **Travel Grant** from Council of Scientific and Industrial Research to attend the 13th Congress of Asian Pacific Society of Respirology, organised by the Asian Pacific Society of Respirology, held at Bangkok, Thailand, November 19 - 22, 2008 *(Guide: Prof. Ashok Shah)*.

Mr Mohd. Adnan Kausar (PhD Student)

- Received **Travel Grant** from Department of Science and Technology (DST) to present the poster entitled *"Isolation and purification of a 24 kD major allergen of culex quinquefasciatus whole body extract"* (by M.A. Kausar, V.K. Vijayan, S.K. Bansal, Maansi Vermani, M.K. Agarwal) at Annual Meeting of American College of Allergy, Asthma and Immunology, Seattle, USA, November 6-11, 2008 *(Guide: Prof. S.K. Bansal)*.

Ms Maansi Vermani (PhD Student)

- Received **Travel Grant** from Council of Scientific and Industrial Research to present the poster entitled *"Aspergillus tamarii, an important allergenic fungus: identification of its major allergens, heterogeneity of patients' IgE response to its allergenic proteins and cross-reactivity with other fungi"* (by Maansi Vermani, V.K. Vijayan, B.K. Menon, S.S. Thukral, M.A. Kausar, M.K. Agarwal) at the 13th Annual Congress of Asian Pacific Society of Respirology held at Bangkok, Thailand, November 19-22, 2008 *(Guide: Prof. S.S. Thukral)*.

Ms Prachi Gupta (PhD Student)

- Received **Travel Grant** from Asian Pacific Society for Respirology to present research paper entitled *"Sphingomyelin metabolism in erythrocyte membrane in asthma"* (by Prachi Gupta, V.K. Vijayan, S.K. Bansal) at the 13th Congress of Asian Pacific Society of Respirology held at Bangkok, Thailand from November 19-22, 2008 *(Guide: Prof. S.K. Bansal)*.

Mr Rakesh K. Mishra (PhD Student)

- Received **Bursary - Award** from European Respiratory Society to present the paper entitled *"Protein kinase C activity and pulmonary histopathology at onset of airway hypersensitivity in guinea pig model of asthma"* (by Rakesh K. Mishra, Ritu Kulshreshtha, S.K. Chhabra, S.K. Bansal) at the 7th ERS (European Respiratory Society) Lung Science Conference on "Cell Proliferation, Differentiation and Carcinogenesis" held at Estoril, Portugal, from March 27-29 2009. **(**University of Delhi also provided a financial support of Rs.10,000 / - for it) *(Guide: Prof. S.K. Bansal)*.

Ms Monika Joon (PhD Student)

- Received **Best Poster Presentation** Award for the poster titled, "*An intergenic promoter mutation in mce-1 operon in a multi-drug resistant clinical isolate of M. tuberculosis leads to gain of function*" (by Monika Joon, Shipra Bhatia, Rashmi Pasricha, Mridula Bose, Vani Brahmachari) at the 10th Sir Dorabji Tata Symposium on Mechanism of Microbial Pathogenesis, held at Indian Institute of Science, Bengaluru, from March 10-12, 2009 *(Guide: Prof. Mridula Bose)*.

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)	Development of novel therapeutics based upon natural products from Indian medicinal plants	Department of Scientific and Industrial Research, Ministry of Science and Technology, Govt. of India March 29, 2007 (Up to June 2009)	57.28 Lakhs
2.	Prof. S.K. Chhabra (Cardiorespiratory Physiology)	Pulmonary function in normal children in Delhi region: development of reference standards for spirometry	I.C.M.R January 23, 2007 (Three Years)	11.74 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)	8.59 Lakhs
4.	Dr Anuradha Chowdhary (Medical Mycology)	Systemic mycoses in HIV positive patients: a study of species spectrum of aetiologic agents, antifungal susceptibility pattern and epidemiologic aspects	D.S.T. May 20, 2005 (Up to August 2008)	11.22 Lakhs
5.	Dr Anuradha Chowdhary (Medical Mycology)	Environmental prevalence of *Cryptococcus neoformans*, its mycoserologic and genotypic characteristion and role in pulmonary infections	I.C.M.R March 01, 2009 (Three Years)	15.82 Lakhs
6.	Prof. S.S.Thukral, Dr Malini Shariff* (Microbiology)	Detection and characterisation of AmpC β-lactamases in clinical isolates of *Klebsiella* spp. and *E. coli*	I.C.M.R. March 29, 2007 (Three years)	13.35 Lakhs
7.	Prof. Mridula Bose (Microbiology)	Functional characterisation of *lspA* gene of *Mycobacterium tuberculosis*: cloning, expression and its role during pathogenesis	D.B.T. June 19, 2006 (Three years)	17.35 Lakhs
8.	Prof. Mridula Bose (Microbiology)	Functional genomics of mammalian cell entry (*mce*) operons in clinical isolates of *M. tuberculosis*: regulation and expression analysis using Knockout strains	D.S.T. September 5, 2006 (Three years)	11.16 Lakhs

***** Presently looking after the project

Sl No.	Faculty Member (Department)	Title of Project	Funding Agency, Date of Sanction/Implementation and Duration	Budget (in Rs.)
9.	Prof. Mridula Bose (Microbiology)	Prospects for the development of anti-tubercular drugs based on transacetylase function of glutamine synthase	D.B.T. May 17, 2007 (Three years)	53.38 Lakhs
10.	Prof. Mridula Bose (Microbiology)	Correlation between genetic polymorphism and homeostasis of Th1 – Th2 cytokines in pulmonary and extra-pulmonary tuberculosis	C.S.I.R. May 17, 2007 (Three years)	26.05 Lakhs
11.	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)	11.33 Lakhs
12.	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
13.	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)	10.62 Lakhs
14.	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 and Naturopathy, Unani, Siddha and Homoeopathy (AYUSH) September 29, 2006 (Three years)	28.29 Lakhs
15.	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
16.	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 March 11, 2005 (Five years)	4.21 Lakhs
17.	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 (Two years)	6.26 Lakhs
18.	Dr Kavita Gulati (Pharmacology)	Pharmacological studies on the role of nitric oxide (NO) in stress adaptation in rats	D.S.T. March 29, 2005 (Four and half years)	16.26 Lakhs

Sl No.	Faculty Member (Department)	Title of Project	Funding Agency, Date of Sanction/Implementation and Duration	Budget (in Rs.)
19.	Prof. M. Fahim (Physiology)	Bronchial reactivity in diabetic guinea pigs	I.C.M.R. December 28, 2005 (Up to March 2009)	7.98 Lakhs
20.	Prof. M. Fahim (Physiology) Dr Anita Kotwani* (Pharmacology)	Regulation of pulmonary vascular tone during hypoxia induced pulmonary vasoconstriction	Life Sciences Research Board (LSRB), DRDO December 13, 2006 (Three years)	14.41 Lakhs
21.	Prof. M. Fahim (Physiology) Dr Anita Kotwani* (Pharmacology)	Lipid reducing herbal compounds provide protection against diabetes induced cardiovascular disorders	Central Council for Research in Unani Medicine (CCRUM) October 10, 2007 (Two years)	13.32 Lakhs
22.	Prof. K. Ravi (Physiology)	Responsiveness of airway rapidly adapting receptors to cigarette smoke inhalation in normal and sensitised rabbits	I.C.M.R. July 21, 2005 (Three years)	14.42 Lakhs
23.	Prof. K. Ravi (Physiology)	Behaviour of pulmonary vagal sensory receptors with myelinated afferents during oxidative stress induced airway hyperreactivity and its modulation by anti-oxidents in guinea pigs	D.S.T. November 8, 2005 (Three years)	23.78 Lakhs
24.	Prof. K. Ravi (Physiology)	Correlation between hypoxic / restraint responses and NO ergic mechanisms	D.I.P.A.S. May 5, 2008 (One year)	4.86 Lakhs
25.	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
26.	Prof. M.K. Agarwal (Respiratory Allergy and Applied Immunology)	Identification, purification and characterisation of components of clinically important insect allergens implicated in allergic rhinitis and bronchial asthma	I.C.M.R. October 23, 2006 (Three years)	13.32 Lakhs
27.	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
28.	Prof. Raj Kumar (Respiratory Allergy and Applied Immunology)	Effect of indoor air pollution on respiratory function of children	Ministry of Environment and Forest October 7, 2003 (Up to July 2008)	20.97 Lakhs

***** Presently looking after the project

Sl No.	Faculty Member (Department)	Title of Project	Funding Agency, Date of Sanction/Implementation and Duration	Budget (in Rs.)
29.	Prof. Raj Kumar (Respiratory Allergy and Applied Immunology)	Tobacco Cessation Clinic at V.P.Chest Institute during the years 2006 and 2007, and related activities	W.H.O. January 27, 2006,	9.64 Lakhs
30.	Dr Madhu Khanna (Respiratory Virology)	A combinatorial antiviral approach against influenza A virus using ribozyme and siRNA	D.B.T. March 21, 2006 (Three and half years)	46.96 Lakhs
31.	Dr Madhu Khanna (Respiratory Virology)	Multi-site monitoring of human influenza in India - Phase I	I.C.M.R. November 8, 2006 (Three years)	72.27 Lakhs
32.	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)	14.17 Lakhs
33.	Dr Sujata K. Dass DST's SERC Fast Track Scheme for Young Scientist (Biochemistry)	A study of synthetic metalloporphyrins as potential antimalarials: *in vitro* screening and *in vivo* effects	D.S.T. June 05, 2006 (Three Years)	17.00 Lakhs
34.	Dr Ajit Kumar DST's SERC Fast Track Scheme for Young Scientist (Biochemistry)	Studies on molecular mechanism of 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
35.	Ms Prachi Gupta Senior Res. Fellow *Guide:* Prof. S.K. Bansal (Biochemistry)	A study of lipid rafts: evaluation of the activity of phospholipase A2 sphingomyclinase and protein kinase C in asthmatic patients using erythrocyte membrane as model	I.C.M.R. November 08, 2007 (Three years)	3.50 Lakhs
36.	Mr Ayanabha Chakraborti Senior Res. Fellow *Guide:* Prof. A. Ray (Pharmacology)	Studies to explore gender related difference in stress response with special emphasis on the role of nitric oxide	I.C.M.R. May 29, 2006 (Up to September 2008)	3.10 Lakhs
37.	Ms Mitali Jindal Senior Res. Fellow *Guide:* Prof. M. Fahim (Physiology)	Role of free radicals in functional changes in cardiovascular regulatory mechanisms on mercury exposure in rats (*in vivo*)	I.C.M.R. December 14, 2006 (Up to December 2008)	4.37 Lakhs

Sl No.	Faculty Member (Department)	Title of Project	Funding Agency, Date of Sanction/Implementation and Duration	Budget (in Rs.)
38.	Ms Anu Sharma Senior Res. Fellow *Guide:* Prof. M. Fahim (Physiology)	Effect of polypharmaceutical herbal drug lipotab on isoproterenol induced chronic heart failure in rats	I.C.M.R. January 03, 2008 (One year)	2.32 Lakhs
39.	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
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 (Nine years)	3.75 Lakhs

Orations/Guest Lectures

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
1.	Dr V.K. Vijayan	• Tobacco control and cardio-pulmonary health • Pulmonary function tests in clinical practice	Manoria Heart Care Institute	National Cardio Pulmonary Symposium Bhopal June 15, 2008
2.	Dr V.K. Vijayan	Diagnosis of interstitial lung disease	American College of Chest Physicians (South India Chapter)	Heart, Lungs and Critical Care Congress 2008 Hyderabad August 7-10, 2008
3.	Dr V.K. Vijayan	Tropical pulmonary eosinophilia	Asian Pacific Society of Respirology	13th Congress of the Asian Pacific Society of Respirology Bangkok, Thailand November 19-22, 2008
4.	Dr V.K. Vijayan	• Common chronic respiratory diseases in India • Bronchoalveolar lavage	V.P.C.I. University of Delhi	International Conference on Pathology of Chest Diseases: An Integrated Approach Delhi December 6-7, 2008
5.	Dr V.K. Vijayan	Eosinophilic bronchitis	Smt NHL Municipal Medical College	42nd Annual Conference of the Indian College of Allergy, Asthma and Applied Immunology (ICAAICON 2008) Ahmedabad December 11-14, 2008
6.	Dr V.K. Vijayan	Therapeutic uses of nitric oxide in cardio-respiratory diseases	V.P.C.I. University of Delhi	National Symposium on Emerging Trends in Nitric Oxide Research: Impact on Health, Disease and Drug Development Delhi January 12, 2009
7.	Prof. H.G. Raj	Role of calreticulin in hypoxia	Department of Chemistry University of Delhi and Embassy of Italy	Indo-Italian Seminar on Green Chemistry and Natural Products Delhi December 5-6, 2008
8.	Prof. H.G. Raj	Establishment of protein acyl transferase function of calreticulin utilising acyloxycoumarins as the acyl group donors	Department of Chemistry University of Delhi	13th ISCB International Conference, Indo-French Seminar on Biomolecular Chemistry Delhi March 9, 2009

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
9.	Prof. H.G. Raj	Evaluation of free radical scavenging and antioxidant activity of polyphenols and its peracetates by EPR spectroscopy	Department of Biochemistry, C.S.M. Medical University	International Conference on Advances in Free Radical Research: Natural Products, Antioxidants and Radioprotectors and 8th Annual Meeting of Society for Free Radical Research – India Lucknow March 19-21, 2009
10.	Prof. M.K. Agarwal	Influenza virus, allergen, IgE and bronchial asthma	Influenza Foundation of India	Seminar on Influenza Viruses in Various Lung Diseases and Other Chronic Diseases Delhi September 22, 2008
11.	Prof. M.K. Agarwal	• Basic immune response • Insect allergy	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2008) Lucknow November 6-9, 2008
12.	Prof. M.K. Agarwal	• Non-pollen, non-fungal aeroallergens • Basic immune response • Aeroallergen research in India: past, present and future	Smt NHL Municipal Medical College	42nd Annual Conference of the Indian College of Allergy, Asthma and Applied Immunology (ICAAICON 2008) Ahmedabad December 11-14, 2008
13.	Prof. S.N. Gaur	Global warming and respiratory diseases	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2008) Lucknow November 6-9, 2008
14.	Prof. S.N. Gaur	• Dilemma of global warming • Clinical workup in allergy patients	Smt NHL Municipal Medical College	42nd Annual Conference of the Indian College of Allergy, Asthma and Applied Immunology (ICAAICON 2008) Ahmedabad December 11-14, 2008
15.	Prof. A. Ray	Theophylline toxicity: in search for an antidote	Indo-Soviet Friendship College of Pharmacy	National Symposium on Drug Discovery Punjab November 14, 2008

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
16.	Prof. A. Ray	Interactions of traditional and modern medicines: focus on adoptgens	National Institute of Pharmaceutical Education and Research	International Symposium on New Developments in Drug Discovery from Natural Products and Traditional Medicines Mohali November 16-21, 2008
17.	Prof. A. Ray	Recent trends in nitric oxide research	DRDO	International Conference on Molecular Medicine DRDE Gwalior December 15, 2008
18.	Prof. A. Ray	Nitric oxide: a target molecule for new drug development	All India Institute of Medical Sciences	International Conference on Translational Pharmacology New Delhi December 18, 2008
19.	Prof. A. Ray	Herbal adaptogens: strategies for drug development	Bangalore University	International Conference on Herbal Medicines Evaluation of Quality, Efficacy and Safety Bangalore February 27, 2009
20.	Prof. A. Ray	Role of translational research in herbal drug development	Punjabi University	National Symposium on Innovations in Drug Discovery and Research Patiala March 3, 2009
21.	Prof. Mridula Bose	Single nucleoitide polymorphism in the genes of *mce1* and *mce-4* operons of *Mycobacterium tuberculosis:* analysis of clinical isolates and standard reference strains	International Centre for Genetic Engineering and Biotechnology	Emerging Trends in Tuberculosis Research: Biomarkers, Drug and Vaccines New Delhi December 1-3, 2008.
22.	Prof. Mridula Bose	Nitric oxide: role in innate and acquired immune response in pulmonary tuberculosis	V.P.C.I. University of Delhi	National Symposium on Emerging Trends in Nitric Oxide Research: Impact on Health, Disease and Drug Development Delhi January 12, 2009

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
23.	Prof. Ashok Shah	Interstitial lung disease: when to suspect?	American College of Chest Physicians (South India Chapter)	Heart, Lungs & Critical Care Congress 2008 Hyderabad August 7-10, 2008
24.	Prof. Ashok Shah	An approach to interstitial lung diseases	LRS Institute of Tuberculosis and Respiratory Diseases	LRS Institute of Tuberculosis and Respiratory Diseases New Delhi September 19, 2009
25.	Prof. Ashok Shah	Pulmonary sarcoidosis in India	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2008) Lucknow November 6-9, 2008
26.	Prof. Ashok Shah	Human seminal plasma allergy	Smt NHL Municipal Medical College	42nd Annual Conference of the Indian College of Allergy, Asthma and Applied Immunology (ICAAICON 2008) Ahmedabad December 11-14, 2008
27.	Prof. Ashok Shah	The spectrum of *Aspergillus* lung disease	Association of Physicians of India	64th Annual Conference of Association of Physicians of India (APICON 2009) Greater Noida, NCR January 29- February 1, 2009
28.	Prof. S.K. Chhabra	Spirometry	RBTB Hospital	RBTB Hospital Delhi September 4, 2009
29.	Prof. S.K. Chhabra	Spirometry interpretation in the wokshop on 'pulmonary function tests'	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2008) Lucknow November 6-9, 2008
30.	Prof. S.K. Chhabra	COPD – newer diagnostic and therapeutic tools	Maulana Azad Medical College	Medicine Update 2008 New Delhi December 11-13, 2008
31.	Prof. K. Ravi	Sensory origin of cough, dyspnoea and muscle weakness in pulmonary oedema	Defence Institute of Physiology and Allied Sciences	First Congress of Asia-Pacific Society for Mountain Medicine Delhi November 28-30, 2008

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
32.	Prof. K. Ravi	Nitric oxide and pulmonary renal reflex	V.P.C.I. University of Delhi	National Symposium on Emerging Trends in Nitric Oxide Research: Impact on Health, Disease and Drug Development Delhi January 12, 2009
33.	Dr Raj Kumar	Methods of smoking cessation	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2008) Lucknow November 6-9, 2008
34.	Dr Raj Kumar	IgE mediated food allergy in older children and adults with asthma and allergic rhinitis: rice, legumes and citrus fruit are major triggers in India	European Academy of Allergology and Clinical Immunology	Food Allergy Training Course of European Academy of Allergology and Clinical Immunology Italy November 13-18, 2008
35.	Dr Raj Kumar	Interesting cases with clinical and radiological correlation	V.P.C.I. University of Delhi	International Conference on Pathology of Chest Diseases: An Integrated Approach Delhi Decemberr 6-7, 2008
36.	Prof. Raj Kumar	Lecture on: Food allergy – Indian scenario	Smt NHL Municipal Medical College	42nd Annual Conference of the Indian College of Allergy, Asthma and Applied Immunology (ICAAICON 2008) Ahmedabad December 11-14, 2008
37.	Dr Raj Kumar	Burden of asthma in India	Indian Medical Association Medical Council of India and American Association of Physicians of Indian Origin	2nd Indo-US Health Summit New Delhi January 3-4, 2009
38.	Dr Balakrishnan Menon	Pulmonary function testing	Babu Jagjivan Ram Hospital	Respiratory Update New Delhi August 12, 2008
39.	Dr Mandira Varma	Excitements in medical microbiology	Indian Science Academy (Delhi Chapter)	Delhi Public School, Dwarka, New Delhi November 15, 2008

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
40.	Dr Anita Kotwani	Research tools to measure medicines prices and availability	Department for Internal Development (DFID)	Medicines Transperency Alliance (MeTA) Meeting for Stakeholders London April 17-18, 2007
41.	Dr Anita Kotwani	Access to affordable medicines	W.H.O.	Geneva Health Forum-2008 Geneva May 25-28, 2008
42.	Dr Anita Kotwani	Price components and access to affordable medicines: issues and options	Department of Pharmacology, JIPMER	SRIPS-2008 Annual Conference of Southern Regional Indian Pharmacological Society Puducherry July 11-13, 2008
43.	Dr Anita Kotwani	Access to essential medicines : the present scenario	Indian Pharmacological Society and National Institute of Pharmaceutical Education and Research	40th Annual Conference of the Indian Pharmacological Society on Changing Trends in Drug Discovery and Development Mohali November 1-3, 2007
44.	Dr Anita Kotwani	Medicine prices and availability with special reference to price components in India: insight for policy makers	W.H.O.	Advance Technical Briefing Seminar on Medicine Prices, Availability and Price Regulation New Delhi November 10-14, 2008
45.	Dr Kavita Gulati	New drug discovery and development	Narsi Munji Institute of Management Studies	Narsi Munji Institute of Management Studies Shirpur, Maharashtra September 13, 2008
46.	Dr Kavita Gulati	Nitric oxide: a potential endogenous adaptogen and a target molecule for drug development	Indo-Soviet Friendship College of Pharmacy	National Symposium on Drug Discovery, Punjab November 14, 2008
47.	Dr Kavita Gulati	Bridging the gap between traditional and modern medicine: a study with UNIM-352 in bronchial asthma	National Institute of Pharmaceutical Education and Research	International Symposium on New Developments in in Drug Discovery from Natural Products and Traditional Medicines Mohali November 16-21, 2008

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
48.	Dr Kavita Gulati	Newer approaches to theophylline toxicity and its antagonism	Indian Pharmacological Society and All India Institute of Medical Sciences	International Conference on Translational Pharmacology and 41st Annual Conference of Indian Pharmacological Society New Delhi December 18-20, 2008
49.	Dr Kavita Gulati	Evidence for a differential neuromodulatory role of nitric oxide in anxiety and seizures	V.P.C.I. University of Delhi	National Symposium on Emerging Trends in Nitric Oxide Research: Impact on Health, Disease and Drug Development Delhi January 12, 2009
50.	Dr Kavita Gulati	Newer insights into the neuromodulatory role of nitric oxide and its impact on drug development	Punjabi University	National Conference on Innovations in Drug Discovery and Research Patiala March 3-5, 2009
51.	Dr Kavita Gulati	Clinical trail and their regulatory issues	Narsi Munji Institute of Management Studies	Narsi Munji Institute of Management Studies Shirpur, Maharashtra March 28, 2009
52.	Dr Ritu Kulshrestha	Analysis of bronchoalveolar lavage fluid	V.P.C.I. University of Delhi	International Conference on Pathology of Chest Diseases: An Integrated Approach Delhi December 6-7, 2008

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 sessions on • Role of yoga in healthy persons • COPD and lung cancer	V.P.C.I. University of Delhi and Morarji Desai National Institute of Yoga	National Seminar on Yogic Management of Cardio-respiratory Disorders Delhi April 5-6, 2008
2.	Dr V.K. Vijayan	Chaired a session on Foreign body extraction	Jaipur Golden Hospital	CME on Interventional Pulmonology New Delhi April 13, 2008
3.	Dr V.K. Vijayan	Organising Chairman Chaired sessions on • Diagnostic bronchology • Important case presentation Lecture on: Bronchoalveolar lavage	V.P.C.I. University of Delhi	National Seminar on Diagnostic Bronchology Delhi June 29, 2008
4.	Dr V.K. Vijayan	Chaired a session on Antibiotics in ICU: a never ending enigma	Department of Medicine, AIIMS	Scientific Programme on Important Therapeutic Issues in Medicine New Delhi August 10, 2008
5.	Dr V.K. Vijayan	Chaired a session on Genetically modified food	Institute of Genomics and Integrative Biology	Symposium on Safety and Allerginicity Assessment of Genetically Modified Foods: Indian Perspectives Delhi August 28, 2008
6.	Dr V.K. Vijayan	Vice-Chairman, Organising Committee Chaired a session on Obesity and lung health	Tuberculosis Association of India and New Delhi Tuberculosis Centre	First International Conference of South East Asia Region (The Union) and 63rd National Conference on Tuberculosis and Chest Diseases (SEAR-NATCON 2008) New Delhi September 8-10, 2008

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
7.	Dr V.K. Vijayan	Chaired a session on Occupational health and safety (OHS) delivery: rural sector and small workplaces Occupational lung diseases Lecture on:	National Institute of Occupational Health	National Workshop on Management of Occupational Health and Safety Delivery: Scopes and Challenges Ahmedabad September 30-October 1, 2008
8.	Dr V.K. Vijayan	Chaired a session on Thoracic empyema	Post Graduate Institute of Medical Education and Research	23rd Annual Update on Pulmonary and Critical Care Medicine; Pleural Diseases Chandigarh October 12, 2008
9.	Dr V.K. Vijayan	Lecture on: Health benefits of smoking cessation	V.P.C.I. University of Delhi	Workshop on Smoking Cessation Delhi October 15, 2008
10.	Dr V.K. Vijayan	Organising Chairman	V.P.C.I. University of Delhi	International Conference on Pathology of Chest Diseases: An Integrated Approach Delhi December 6-7, 2008
11.	Dr V.K. Vijayan	Chairperson of "WAO-Gloria Lecture" on the topic 'Immunotherapy'	Smt NHL Municipal Medical College	42nd Annual Conference of the Indian College of Allergy, Asthma and Applied Immunology (ICAAICON 2008) Ahmedabad December 11-14, 2008
12.	Dr V.K. Vijayan	Moderator, panel discussion of a session on Emerging trends in nitric oxide research	Ranbaxy Science Foundation	XXII Round Table Conference of Ranbaxy Science Foundation on Challenges of MDR / XDR Tuberculosis in India New Delhi December 13, 2008
13.	Dr V.K. Vijayan	Organising Chairman Chaired a session on Nitric oxide	V.P.C.I. University of Delhi	National Symposium on Emerging Trends in Nitric Oxide Research: Impact on Health, Disease and Drug Development Delhi January 12, 2009

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
14.	Dr V.K. Vijayan	Lecture on: Pulmonary function tests	National Institute of Occupational Health	Workshop on Silica Exposure: Diseases and Management Ahmedabad January 15-17, 2009
15.	Dr V.K. Vijayan	Organising Chairman Lecture on: Path-physiology of asthma	V.P.C.I. University of Delhi and Institute of Genomics and Integrative Biology	34th Workshop on Respiratory Allergy: Diagnosis and Management Delhi February 16-19, 2009
16.	Prof. H.G. Raj	Chaired the session II of the Symposium	V.P.C.I. University of Delhi	National Symposium on Emerging Trends in Nitric Oxide Research: Impact on Health, Disease and Drug Development Delhi January 12, 2009
17.	Prof. H.G. Raj	Chaired a session on Methodology and recent developments in laboratory techniques	Department of Biochemistry, C.S.M. Medical University	International Conference on Advances in Free Radical Research: Natural Products, Antioxidants and Radioprotectors and 8th Annual Meeting of Society for Free Radical Research – India Lucknow March 19-21, 2009
18.	Prof. M.K. Agarwal	Faculty Member	Influenza Foundation of India	Clinical Symposium on Uncovering the Burden of Influenza – Asia Pacific Advisory Committee on Influenza (APACI) and Influenza Foundation of India New Delhi October 5, 2008
19.	Prof. M.K. Agarwal	Faculty Member	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2008) Lucknow November 6-9, 2008
20.	Prof. M.K. Agarwal	Presented a paper on Insect aeroallergens: clinico-immunologic studies, identifi cation of major allergens and heterogeneity of patients' IgE response to different allergenic components	Asian Pacific Society of Respirology	13th Annual Conference of Asian Pacific Society of Respirology Bangkok, Thailand November 19-22, 2008

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
21.	Prof. M.K. Agarwal	Faculty Member Chaired a symposium on Biosafety of GM foods Chaired sessions on • Eosiniphilic bronchitis • Urticaria	Smt NHL Municipal Medical College	42nd Annual Conference of the Indian College of Allergy, Asthma and Applied Immunology (ICAAICON 2008) Ahmedabad December 11-14, 2008
22.	Prof. M.K. Agarwal	Faculty Member Lectures on: • Basic immunology • Insect allergy • Laboratory investigations relating to diagnosis of respiratory allergy (including practical training)	V.P.C.I. University of Delhi and Institute of Genomics and Integrative Biology	34th Workshop on Respiratory Allergy: Diagnosis and Management Delhi February 16-19, 2009
23.	Prof. S.N. Gaur	Presented a poster on Evaluating role of inhaled magnesium sulphate as an adjunct to salbutamol and ipratropium in severe acute asthma	American College of Chest Physicians	Annual Conference of the American College of Chest Physicians (CHEST-2008) Philadelphia, USA October 25-30, 2008
24.	Prof. S.N. Gaur	National Advisor	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2008) Lucknow November 6-9, 2008
25.	Prof. S.N. Gaur	Member, Organising Committee Chairperson of "WAO-Gloria Lecture" on the topic 'Anaphylaxis' Moderator of a panel discussion on Immunotherapy	Smt NHL Municipal Medical College	42nd Annual Conference of the Indian College of Allergy, Asthma and Applied Immunology (ICAAICON 2008) Ahmedabad December 11-14, 2008
26.	Prof. S.N. Gaur	Faculty Member Lectures on: • History taking and clinical aspects of respiratory allergy • Immunotherapy: sub-cutaneous	V.P.C.I. University of Delhi and Institute of Genomics and Integrative Biology	34th Workshop on Respiratory Allergy: Diagnosis and Management Delhi February 16-19, 2009

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
27.	Prof. A. Ray	Lecture on: Newer insights into the mechanisms of action of indigenous adaptogens	Chhatrapti Shahuji Maharaj Medical University (formerly, K.G. Medical) College, Lucknow)	Workshop on Relevance of Modern Methods of Pharmacological Studies to Traditional Medicine Lucknow October 16-21, 2008
28.	Prof. A. Ray	Organising Secretary	National Institute of Pharmaceutical Education and Research	International Symposium on New Developments in Drug Discovery from Natural Products and Traditional Medicines Mohali November 16-21, 2008
29.	Prof. Mridula Bose	Lecture on: Emerging and re-emerging infectious diseases	Miranda House, University of Delhi	Workshop on Medical Biotechnology Delhi November 1 -15, 2008
30.	Prof. Mridula Bose	Chaired a session on Community-acquired infections	BLK Memorial Hospital and Safdarjung Hospital	Update on Infectious Diseases (CME on antibiotic resistance in infectious diseases) New Delhi November 20, 2008
31.	Prof. Mridula Bose	Chaired a session on New technologies for TB diagnosis: what is in the pipelines?	Vardhman Mahavir Medical College and Safdarjung Hospital	Recent Aspects of TB Diagnosis and Management New Delhi January 20, 2009
32.	Prof. Ashok Shah	Chaired a guest lecture on Meeting the challenge of invasive fungal infections	Delhi Heart and Lung Institute in association with Indian Society of Critical Care Medicine (Delhi & NCR)	ICU Infections Update New Delhi May 4, 2008
33.	Prof. Ashok Shah	Chaired a session on Hot topic – cellular immunology Presented a paper on Allergic rhinitis: *Aspergillus* sensitisation increases the severity of sinusitis in 'blockers' as compared to 'sneezers and runners'	European Academy of Allergology and Clinical Immunology	XXVIIth Congress of the European Academy of Allergology and Clinical Immunology Barcelona, Spain June 7-11, 2008
34.	Prof. Ashok Shah	Lecture on: Preparation and anesthesia of patients for flexible fiberoptic bronchoscopy	V.P.C.I. University of Delhi	National Seminar on Diagnostic Bronchology Delhi June 29, 2008

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
35.	Prof. Ashok Shah	Chaired a session on Epidemiology and clinical diversities	Tuberculosis Association of India and New Delhi Tuberculosis Centre	First International Conference of South East Asia Region (The Union) and 63rd National Conference on Tuberculosis and Chest Diseases (SEAR-NATCON 2008) New Delhi September 8-10, 2008
36.	Prof. Ashok Shah	Chaired a session on Environmental lung disease	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2008) Lucknow November 6-9, 2008
37.	Prof. Ashok Shah	Chaired a session on Drug and skin allergy Chaired a poster discussion on COPD	Smt NHL Municipal Medical College	42nd Annual Conference of the Indian College of Allergy, Asthma and Applied Immunology (ICAAICON 2008) Ahmedabad December 11-14, 2008
38.	Prof. Ashok Shah	Lecture on: Pulmonary sarcoidosis: presentation in India	National College of Chest Physicians (NCCP) India	Symposium on Sarcoidosis, at the Monthly Clinical Meeting of the National College of Chest Physicians (India) New Delhi January 18, 2009
39.	Prof. Ashok Shah	Lecture on: Allergic bronchopulmonary aspergillosis	V.P.C.I. University of Delhi and Institute of Genomics and Integrative Biology	34th Workshop on Respiratory Allergy: Diagnosis and Management Delhi February 16-19, 2009
40.	Prof. S.K. Chhabra	Chaired session I on Diagnostic bronchology	V.P.C.I. University of Delhi	National Seminar on Diagnostic Bronchology Delhi June 29, 2008
41.	Prof. S.K. Chhabra	Respiratory health effects of outdoor air pollution	Indian Council of Medical Research and Post Graduate Institute of Medical Education and Research	Joint Indo-US Workshop on Environmental Risks of Respiratory Diseases Chandigarh September 5-6, 2008

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
42.	Prof. S.K. Chhabra	Chaired a panel discussion on Management of COPD	Tuberculosis Association of India and New Delhi Tuberculosis Centre	First International Conference of South East Asia Region (The Union) and 63rd National Conference on Tuberculosis and Chest Diseases (SEAR-NATCON 2008) New Delhi September 8-10, 2008
43.	Prof. S.K. Chhabra	Lecture on: Health effects of air pollution	Indian Association for Air Pollution Control	Workshop on Air Pollution and Human Health, New Delhi September 23, 2008
44.	Prof. S.K. Chhabra	Expert in the 'meet the expert' session on Management of severe COPD	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2008) Lucknow November 6-9, 2008
45.	Prof. S.K. Chhabra	Chaired a session on Asthma control	Association of Physicians of India	64th Annual Conference of the Association of Physicians of India (APICON 2009) Greater Noida, NCR January 29- February 1, 2009
46.	Prof. S.K. Chhabra	Lecture on: Epidemiology of bronchial asthma Practical demonstrations on Pulmonary function tests	V.P.C.I. University of Delhi and Institute of Genomics and Integrative Biology	34th Workshop on Respiratory Allergy: Diagnosis and Management Delhi February 16-19, 2009
47.	Prof. S.K. Chhabra	Lecture on: Adverse effects of air pollution	Centre for Science and Environment	Workshop on Clean Air Imperatives and Urban Mobility New Delhi March 2, 2009

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
49.	Prof. K. Ravi	Presented papers on • Does oxidative stress affect various polysomnography parameters in obstructive sleep apneahypopnea syndrome (OSAHS) patients? • Role of nitric oxide (NO) in the diuresis and natriuresis occurring in patients with obstructive sleep apnea-hypopnea syndrome (OSAHS)	Asian Pacific Society of Respirology	13th Congress of the Asian Pacific Society of Respirology Bangkok, Thailand November 19-22, 2008
50.	Prof. Raj Kumar	Presented a paper on An Indian experience of bronchoscopy in 284 patients	World Congress of Bronchoscopy and World Congress of Bronchoesophysiology	15th World Congress of Bronchoscopy and 15th World Congress of Bronchoesophysiology Tokyo, Japan March 31-April 2, 2008
51.	Prof. Raj Kumar	Organising Secretary Lecture on: Transbronchial needle aspiration	V.P.C.I. University of Delhi	National Seminar on Diagnostic Bronchology Delhi June 29, 2008
52.	Prof. Raj Kumar	Lecture on: Smoking cessation	Indian Medical Association (North Delhi Chapter)	Indian Medical Association (North Delhi Chapter) Delhi September 26, 2008
53.	Prof. Raj Kumar	Organising Secretary Lectures on: • Tobacco cessation: our experiences • How to set up a tobacco cessation clinic? • Tobacco cessation	Tobacco Cessation Clinic, V.P.C.I. University of Delhi	Workshop on Smoking Cessation Delhi October 15, 2008
54.	Prof. Raj Kumar	Organising Secretary Lecture on: Diagnosis and management of food allergy	V.P.C.I. University of Delhi and Institute of Genomics and Integrative Biology	34th Workshop on Respiratory Allergy: Diagnosis and Management Delhi February 16-19, 2009
55.	Prof. Raj Kumar	Presented a paper on Food allergy: Indian scenario	Malaysian Society of Allergy and Immunology (MSAI)	10th Malaysian Congress and Exhibition on Allergy and Immunology Selangor, Malaysia February 27-28, 2009

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
56.	Dr Balakrishnan Menon	Presented papers on • Evaluation of high sensitivity C-reactive protein in patients of bronchial asthma and its correlation with exacerbation rate and pulmonary function • Evaluation of the effect of inhaled ciclesonide on inflammatory and allergic markers and pulmonary function in bronchial asthma	European Respiratory Society	18th European Respiratory Society Annual Congress (ERS 2008) Berlin, Germany October-4-8, 2008
57.	Dr Balakrishnan Menon	Panelist in a panel disscusion on Bronchial asthma	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2008) Lucknow November 6-9, 2008
58.	Dr Balakrishnan Menon	Presented a paper on Evaluation of Paraoxonase-1 activity and its relation to the severity of obstructive lung impairment in patients of COPD	Asian Pacific Society of Respirology	13th Congress of the Asian Pacific Society of Respirology Bangkok, Thailand November 19-22, 2008
59.	Dr Balakrishnan Menon	Lecture on: MDR-TB: the Indian scenario and strategies for control	Babu Jagjivan Ram Hospital	CME on Tuberculosis New Delhi March 24, 2009
60.	Dr Mandira Varma	Lectures on: • Introduction to biotechnology • Recent advances in diagnosis of tuberculosis	Miranda House, University of Delhi	Medical Biotechnology Workshop Delhi November 1-15, 2008
61.	Dr Mandira Varma	Presented a poster on Identification of *M. tuberculosis* by PCR restriction analysis directly in clinical samples	Chacha Nehru Bal *Chikitsalay*	3rd Meeting of the Indian Association of Medical Microbiologists (Delhi Chapter) Delhi December 6, 2008
62.	Dr Mandira Varma	Lecture on: Laboratory diagnosis of tuberculosis and newer diagnostic techniques	Chacha Nehru Bal *Chikitsalay*	2nd CME on Pediatric Infectious Diseases Delhi January 17-18, 2009
63.	Dr Anuradha Chowdhary	Lecture on: Antifungal susceptibility testing: protocols and quality control	Chacha Nehru Bal *Chikitsalay*	2nd CME on Pediatric Infectious Diseases Delhi January 17-18, 2009

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
64.	Dr Anuradha Chowdhary	Presented a paper on First isolations in India of *Candida nivariensis*, a globally emerging opportunistic pathogen	Indian Association of Medical Microbiologists (Delhi Chapter)	1st Annual Conference of the Indian Association of Medical Microbiologists (Delhi Chapter) New Delhi March 27-28, 2009
65.	Dr Madhu Khanna	Presented a paper on A combinatorial antiviral approach against influenza A virus using ribozyme and siRNA	European Scientific Working Group on Influenza	Third European Influenza Conference Vilamoura, Portugal September 14-17, 2008
66.	Dr Anita Kotwani	Presented a paper on Availability, price, and affordability of two inhalation medicines for treatment of asthma in different states of India	Academy Health	Annual Research Meeting of Academy Health Washington D.C., USA June 8-10, 2008
67.	Dr Anita Kotwani	Participated in a panel discussion on Problems, pitfall and success stories of drug information services	Department of Pharmacology, JIPMER	SRIPS-2008 Annual Conference of Southern Regional Indian Pharmacological Society Puducherry July 11-13, 2008
68.	Dr Anita Kotwani	Presented a paper on Surveillance of antibiotic use in the community Chaired a session on Toxicology	Indian Pharmacological Society and National Institute of Pharmaceutical Education and Research	40th Annual Conference of the Indian Pharmaco-logical Society on Changing Trends in Drug Discovery and Development Mohali November 1-3, 2007
69.	Dr Anita Kotwani	Faculty	W.H.O.	Advance Technical Briefing Seminar on Medicine Prices, Availability and Price Regulation New Delhi November 10-14, 2008
70.	Dr Kavita Gulati	Presented papers on • Role of nitric oxide during stress and its potential as a target molecule for drug development • Pharmacological and bio-chemical evidence for the role of oxidative stress in theophylline toxicity: an experimental study with clinical implications	Canadian Society for Clinical Pharmacology (CSCP) and International Union of Pharmacology and Clinical Pharmacology (IUPHAR),	IXth World Conference on Clinical Pharmacology and Therapeutics Quebec, Canada July 27-August 1, 2008

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
71.	Dr Kavita Gulati	Lecture on: Complimentary roles for clinical and preclinical studies in traditional medicine research: focus on bronchial asthma	Chhatrapti Shahuji Maharaj Medical University (formerly, K.G. Medical College, Lucknow)	Workshop on Relevance of Modern Methods of Pharmacological Studies to Traditional Medicine Lucknow October 17-18, 2008
72.	Dr Kavita Gulati	Presented a paper on Experimental studies on the antioxidant role of nitric oxide during stress Chaired a session of poster presentation award	Indian Pharmacological Society and All India Institute of Medical Sciences	International Conference on Translational Pharmacology and 41st Annual Conference of the Indian Pharmacological Society New Delhi December 18-20, 2008
73.	Dr Vishal Bansal	Lecture on: Mobile phones and human health	Centre for Professional Development in Higher Education (CPDHE), University of Delhi	UGC-sponsored Orientation Course Delhi May 29, 2008
74.	Dr Ritu Kulshrestha	Lecture on: Role of pathologist in diagnostic bronchoscopy	V.P.C.I. University of Delhi	National Seminar on Diagnostic Bronchology Delhi June 29, 2008
75.	Dr Ritu Kulshrestha	Participated on a teleconferencing session on Role of pathologist in diagnostic bronchoscopy	National Board of Examinations	National Board of Examinations Delhi August 14, 2008
76.	Dr Ritu Kulshrestha	Lecture on: Role of immunity in disease prevention and disease progress	Nehru Homeopathic Medical College	Re-orientation and Training Programme in Pathology Delhi November 17-22, 2008
77.	Dr Ritu Kulshrestha	Organising Secretary	V.P.C.I. University of Delhi	International Conference on Pathology of Chest Diseases: An Integrated Approach Delhi December 6-7, 2008
78.	Dr Ritu Kulshrestha	Chaired a session on Medical student pathology education	Gajaraj Raja Medical College	Indo-US International CME on Surgical Pathology, Cytology and Hematology Agra February 3-5, 2009

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
79.	Dr Ritu Kulshrestha	Lectures on: • Interpretation of transbronchial lung biopsy • Role of BAL fluid analysis in non-neoplastic lung lesions	Seth G.S. Medical College and KEM Hospital	International CME on Pathology of Non-neoplastic Pulmonary Lesions Mumbai February 12-14, 2009
80.	Dr Avi Kumar (MD Student) *(Guide: Prof. Ashok Shah)*	Presented a paper on Occurrence of upper airway symptoms and their impact on quality of life (QoL) in patients with COPD	Asian Pacific Society of Respirology	13th Congress of the Asian Pacific Society of Respirology Bangkok, Thailand November 19-22, 2008
81.	Mr Tapesh Kumar Tyagi (PhD Student) *(Guide: Prof. H.G. Raj)*	Presented a poster on Studies on the novel enzyme acetoxy drug: protein transacetylase from mesophelic fungus *Starkeyomyces sp.*	Department of Chemistry, University of Delhi and Embassy of Italy	Indo-Italian Seminar on Green Chemistry and Natural Products Delhi December 5-6, 2008
82.	Dr Ajit Kumar DST's SERC Fast Track Scheme for Young Scientist *(Guide: Prof. H.G. Raj)*	Presented a poster on Characterisation of dihydrolipoamide dehydrogenase of *Starkeyomyces koorchalomoides* as a moon lighting protein	Department of Biochemistry, C.S.M. Medical University	International Conference on Advances in Free Radical Research: Natural Products, Antioxidants and Radioprotectors and 8th Annual Meeting of the Society for Free Radical Research – India Lucknow March 19-21, 2009
83.	Mr Anil Baghel (PhD Student) *(Guide: Prof. H.G. Raj)*	Presented a poster on Protein acetyl transferase function of glutamine synthetase of *M. smegmatis*	International Centre for Genetic Engineering and Biotechnology	Emerging Trends in Tuberculosis Research: Biomarkers, Drug and Vaccines New Delhi December 1-3, 2008
84.	Mr Neeraj Kumar (PhD Student) *(Guide: Prof. S.K. Bansal)*	Presented a paper on X-linked adrenoleukodystrophy gene polymorphisms and mutation in Indian population	Human Genome Organisation	13th Human Genome Meeting "Genomics and the Future of Medicine" of HUGO 2008" Hyderabad September 27-30, 2008
85.	Ms Prachi Gupta (PhD Student) *(Guide: Prof. S.K. Bansal)*	Presented a paper on Sphingomyelin metabolism in erythrocyte membrane in asthma	Asian Pacific Society of Respirology	13th Congress of the Asian Pacific Society of Respirology Bangkok, Thailand November 19-22, 2008

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
86.	Mr Rakesh K. Mishra (PhD Student) *(Guide: Prof. S.K. Bansal)*	A preliminary study on protein kinase C and associated airway pathology in early phase of airway hypersensitivity in a guinea pig model of asthma	V.P.C.I. University of Delhi	International Conference on Pathology of Chest Diseases: An Integrated Approach Delhi December 6-7, 2008
87.	Mr Rakesh K. Mishra (PhD Student) *(Guide: Prof. S.K. Bansal)*	Protein kinase C activity and pulmonary histopathology at onset of airway hypersensitivity in guinea pig model of asthma	European Respiratory Society	7th ERS (European Respiratory Society) Lung Science Conference on 'Cell Proliferation, Differentiation and Carcinogenesis' Estoril, Portugal March 27-29, 2009
88.	Mr Rajesh Sinha (PhD Student) *(Guide: Prof. Mridula Bose)*	Presented a poster on Functional characterisation of re-folded proteins of mycobacteria	Indian Institute of Science	10th Sir Dorabji Tata Symposium on Mechanism of Microbial Pathogenesis Bangalore March 10-12, 2009
89.	Ms Monika Joon (PhD Student) *(Guide: Prof. Mridula Bose)*	Presented a poster on An intergenic promoter mutation in *mce1* operon in a multi-drug resistant clinical isolate of *M. tuberculosis* leads to gain of function	Indian Institute of Science	10th Sir Dorabji Tata Symposium on Mechanism of Microbial Pathogenesis Bangalore March 10-12, 2009
90.	Ms Maansi Vermani (PhD Student) *(Guide: Prof. M.K. Agarwal)*	Presented a poster on *Aspergillus tamarii*, an important allergenic fungus: identification of its major allergens, heterogeneity of patients' IgE response to its allergenic proteins and cross-reactivity with other fungi	Asian Pacific Society of Respirology	13th Congress of the Asian Pacific Society of Respirology Bangkok, Thailand November 19-22, 2008

Participation in Advanced and Specialised Training Programme by Faculty Members

Sl No.	Participant (Department)	Course Title/ Topic	Training Duration	Host
1.	Prof. A. Ray (Pharmacology)	Workshop on Traditional Medicines	October 17-18, 2008	CSM Medical University Lucknow (Uttar Pradesh)
2.	Prof. Raj Kumar (Respiratory Allergy and Applied Immunology)	Interventional Bronchoscopy	August 11-15, 2008	Samitivij Sukhuvit Hospital and Siraj Hospital, Bangkok, Thailand
3.	Prof. Raj Kumar (Respiratory Allergy and Applied Immunology)	Food Allergy Training Course	November 13-15, 2008	European Academy of Allergology and Clinical Immunology Castlebrando, Treviso, Italy
4.	Dr Madu Khanna (Respiratory Virology)	European Accreditation Council for Continuing Medical Education (EACCME)	September 14-17, 2008	European Scientific Working Group on Influenza

Short-Term Specialised Trainings Imparted by Faculty Members

Sl No.	Name, Subject and Organisation	Course Title/Topic	Faculty Member (Department)	Period
1.	Mr Deepak Joshi MSc (Microbiology) Department of Microbiology Institute of Applied Medicine and Research Ch. Charan Singh University Meerut (Uttar Pradesh)	Microbiology and molecular techniques	Prof. Mridula Bose (Microbiology)	March 3 - May 30, 2008
2.	Mr Varun Kapoor BTech (Biotechnology) Institute of Engineering Rai University International New Delhi	Microbiology and molecular techniques	Prof. Mridula Bose (Microbiology)	April 15 - May 14, 2008
3.	Mr Stanly Pradeep F. MSc (Biotechnology) Department of Biotechnology St. Joseph's College Trichirapalli (Tamil Nadu)	Microbiology and molecular techniques	Prof. Mridula Bose (Microbiology)	May 5 - June 4, 2008
4.	Mr Chandra Sekhar Singh MSc (Biomedical Sciences) J.C. Bose Institute of Life Sciences Bundelkhand University Jhansi (Uttar Pradesh)	Microbiology and molecular techniques	Prof. Mridula Bose (Microbiology)	February 1-March 31, 2009
5.	Ms Khadija Bhanu MSc (Microbiology) Kanya Gurukul Mahavidyalay Hardwar (Uttarakhand)	Microbiology and molecular techniques	Prof. Mridula Bose (Microbiology)	March 1-31, 2009
6.	Ms Asha Goyal MSc (Biotechnology) Ch. Charan Singh University Meerut (Uttar Pradesh)	Identification of clinical isolates of *M. tuberculosis* by PCR restriction analysis	Dr Mandira Varma (Microbiology)	January 1- June 30, 2008
7.	Mr Stanly Pradeep F. MSc (Biotechnology) Department of Biotechnology St. Joseph's College Trichirapalli (Tamil Nadu)	Analysis of reifampicin resistance mutations in clinical isolates of *M. tuberculosis* by dot-blot hybridisation assay	Dr Mandira Varma (Microbiology)	December 5, 2008-March 4, 2009

Sl No.	Name, Subject and Organisation	Course Title/Topic	Faculty Member (Department)	Period
8.	Dr Hans Raj Khanna Master of Veterinary Public Health (MPH Veterinary Fellow) Chiang Mai University and Freie Universitat, Berlin	Prevalence of *Salmonella* spp. in Broiler retail meat shops in New Delhi	Dr Malini Shariff (Microbiology)	September 2008 - February 2009
9.	Dr Nidhi Chauhan (DNB Student) E.S.I. Hospital, New Delhi	Pulmonary histopathology and cytology	Dr Ritu Kulshrestha (Pathology)	February 17- March 10, 2009
10.	Mr Dhirendra Kumar MSc (Biomedical Sciences) Bundelkhand University Bundelkhand (Uttar Pradesh)	Experimental pharmacology techniques	Prof. A. Ray (Pharmacology)	June – August 2008
11.	Mr A. Bhattacharya MSc (Pharmacovigilance) Kolkata University Kolkata (West Bengal)	Pharmacovigilance activities and methods in respiratory medicine	Prof. A. Ray (Pharmacology)	December 1-31, 2008

Cultural and Sports Activities

During this year, the staff of the Institute had a very eventful and memorable time. The performances (songs and dances, mono-actions, jokes, etc.) of the staff members at the Annual Function of the Delhi University Staff Club were highly appreciated.

In the Sports and Games events the staff members of the Institute had participated in various Annual Tournaments and Annual Athletic Meet of Delhi University Staff Club and won awards in various events.

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Institute celebrated the Republic Day function on 26th January 2009.

List of Publications

1. Agarwal MK, Vermani M. Immune system and allergic diseases. In: Thakor N, Patel M, editors. *Allergy*. Ahmedabad: Smt. NHL Medical College; 2008:pp1-19.

2. Agarwal MK, Vijayan VK, Vermani M. Effect of azelastine nasal spray on histamine-and allergen-induced skin wheal response in patients with allergic rhinitis. *J Asthma* 2008;45:548-51.

3. Arora Shvetambri, Tyagi YK, Kumar A, Majumder S, Saluja Daman, Raj HG, *et al.* The role of calreticulin transacetylase in the activation of human platelet nitrite reductase by polyphenolic acetates. *Biol Pharmaceutical Bull* 2009;32:161-5.

4. Bansal V, Hill Kylie, Dolmage TE, Brooks Dina, Woon Lynda, Goldstein RS. Modifying track layout from straight to circular has a modest effect on the six-minute walk distance. *Chest* 2008;133:1155-60.

5. Bose Mridula. Natural reservoir, zoonotic tuberculosis and interface with human tuberculosis: an unsolved question (commentary). *Indian J Med Res* 2008;128:4-6.

6. Chakraborti A, Gulati K, Ray A. Age related changes in stress-induced neurobehavioral effects in rats modulation by antioxidants and nitrergic agents. *Behav Brain Res* 2008;194:86-91.

7. Chawla S, Prasad AK, Chhabra SK, Vijayan P, Vermani M, Agarwal MK. Influenza virus- and cockroach allergen-specific IgE in virus induced exacerbation of asthma. *Indian J Allergy Asthma Appl Immunol* 2008;22:91-7.

8. Chhabra SK. Bronchial asthma. In: Shah SN, editor. *API Textbook of Medicine;* 8th edn. Mumbai: The Association of Physicians of India; 2008:pp355-61.

9. Chhabra SK. Using arm span to estimate height: comparative evaluation of impact of three measures of height on interpretation of spirometry. *Ann Thorac Med* 2008;3:94-99.

10. Chhabra SK. Regional variations in vital capacity in adult males in India: comparison of regression equations from four regions and impact on interpretation of spirometric data. *Indian J Chest Dis Allied Sci* 2009;51:7-13.

11. Chhabra SK, Sahay S, Ramaraju K. Allergic bronchopulmonary aspergillosis complicating childhood asthma. *Indian J Pediatr* 2009;76:331-2.

12. Diwakar A, Panjabi C, Shah A. Allergic bronchopulmonary aspergillosis, allergic *Aspergillus* sinusitis and their co-occurrence. *Open Allergy J* 2008;1:52-61.

13. Gautam VP, Shah A, Malhotra A, Dewanwala A, Taneja DK, Gupta VK, *et al.* General practitioners' knowledge of childhood asthma in Delhi, India. *Int J Tuberc Lung Dis* 2008;12:677-82.

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15. Grover RS, Kumar Raj. Exhaled carbon monoxide levels: as a marker of clinical severity and control of asthma. *J Asthma* 2008;45:677-80.

16. Gulati K, Ray A. Immunotoxicity. In: Gupta R, editor. *Handbook of Toxicology of Chemical Warfare Agents.* New York: Elsevier Publication; 2008:pp595-609.

17. Gulati K, Chakraborti A, Ray A. Differential role of nitric oxide (NO) in acute and chronic stress induced neurobehavioral modulation and oxidative injury in rats. *Pharmacol Biochem Behav* 2008;92:272-6.

18. Gupta Garima, Baghel AS, Bansal Seema, Tyagi TK, Kumari Ranju, Saini NK, *et al.* Establishment of glutamine synthetase of *Mycobacterium smegmatis* as a protein acetyltransferase utilizing polyphenolic acetates as the acetyl group donors. *J Biochem* (Tokyo) 2008;144:709-15.

19. Gupta S, Kulshrestha Ritu, Chabbra SK. Nontraumatic herniation of the liver in an asthmatic. *J Postgrad Med* 2008;54:169-70.

20. Gupta SK, Gupta RC, Chhabra SK, Eskiocak S, Gupta AB, Gupta R. Health issues related to N pollution in water and air. *Cur Sci* 2008;94:1467-77.

21. Hill Kylie, Bansal V, Brooks Dina, Goldstein RS. Repeat pulmonary rehabilitation programs confer similar increases in functional exercise capacity to initial programs. *J Cardiopulm Rehabil Prev* 2008;28:410-14.

22. Hiremath SS, Chowdhary A, Randhawa HS, Kowshik T, Sun S, Xu J. Long distance dispersal and recombination in environmental populations of *Cryptococcus neoformans* var. *grubii* from India. *Microbiology* 2008;154:1513-24.

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