ANNUAL REPORT
2009-10

Vallabhbhai Patel Chest Institute
University of Delhi, Delhi, India

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From the Director's Desk

It is with great pleasure I am presenting the Annual Report of the Vallabhbhai Patel Chest Institute (VPCI) for the year 2009-10. This report reviews the manifold activities of the Institute in the areas of "teaching and education", "research" and "patient care".

We are very happy and honoured that Prof. P.N. Tandon, President, National Brain Research Centre Society and Emeritus Professor, Neurosurgery, All India Institute of Medical Sciences, New Delhi, has been appointed as the new Chairman of the Governing Body of the Institute by the University of Delhi. We would like to record our gratitude and appreciation to Prof. N.K. Ganguly, previous Chairman, Governing Body for his guidance and support for the last three years. An important milestone during this year is the approval to start DM course in Pulmonary and Critical Care Medicine with an intake of two students every year by the University of Delhi.

Two prestigious orations to perpetuate the memory of our two former Directors were organized this year. On the occasion of the 60th Foundation Day Celebrations, Prof. Peter J. Barnes, Head of the Department of Respiratory Medicine, Imperial College, London, Professor of Thoracic Medicine and Head of Airway Disease at the National Heart and Lung Institute and Honorary Consultant Physician at Royal Brompton Hospital, London, delivered the "11th Prof. Raman Viswanathan-VPCI Oration" on 7th April 2009. A "National Seminar on Environmental Lung Diseases" was also organized on 6th April 2009. Prof. Arun Dharmarajan, Winthrop Professor, School of Anatomy and Human Biology, Faculty of Life and Physical Sciences, the University of Western Australia, Nedlands, Perth, Western Australia, delivered the "5th Prof. Autar Singh Paintal Memorial Oration" on 24th September 2009. The Institute also organized two important meetings on Tobacco Cessation; *i*. National Review Meeting of Tobacco Cessation Centres on 28th-29th October 2009 and *ii*. National Consultation Meeting to Develop Guidelines for Tobacco Cessation on 29th-30th October 2009.

In order to commemorate the 25 years of the Bhopal Gas Disaster, the World's worst chemical industrial disaster which occurred on midnight of 2/3 December 1984, the Institute in collaboration with the Indian Council of Medical Research organized a Symposium on "Research on Bhopal Gas Tragedy" on 3rd December 2009. The 35th Workshop on "Respiratory Allergy: Diagnosis and Management" was also organized by VPCI in collaboration with the Institute of Genomics and Integrative Biology from 8th-12th March 2010. During the year under review, the Institute has played a vital role in conducting investigations for the pandemic influenza H1N1 virus as per the directive of the Government of India.

The Faculty members are engaged in various research projects sponsored by different agencies of Government of India, W.H.O., etc. The vibrancy of these research projects/activities can be well judged from the list of publications in peer reviewed journals, guest lectures delivered and original papers presented in the national and international conferences by the faculty members and students of the Institute. The hospital wing (Viswanathan Chest Hospital) of the Institute continued to provide excellent diagnostic and treatment services including Critical Care management to patients suffering from respiratory and allied diseases.

Dr V.K. Vijayan
Director

"National Consultation to Develop Guidelines for Tobacco Cessation" held on 29th-30th October 2009. ***Dignitaries on the dais (left to right)*****: Dr Shiv Lal, Special Director General of Health Services (Public Health), Ministry of Health and Family Welfare, Government of India (delivering the Inaugural address); Dr V.K. Vijayan (Director, VPCI); Dr D.C. Jain, Deputy Director General, DGHS, Ministry of Health and Family Welfare, Government of India; Dr Vinayak M. Prasad, Director (Public Health) Ministry of Health and Family Welfare, Government of India; Ms Vineet Gill Munish, National Professional Officer (Tobacco Free Initiative), WHO Country Office India, New Delhi.**

"National Seminar on Environmental Lung Diseases" held on 6th April 2009. ***Dignitaries on the dais (left to right)*****: Dr V.K. Vijayan (Director, VPCI; delivering the Welcome address); Dr P.K. Nag, Director, National Institute of Occupational Health (ICMR), Ahmedabad; Prof. Raj Kumar, Organising Secretary of the Seminar.**

ANNUAL REPORT (2009-10)

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MILESTONES OF VPCI

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

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

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

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

THE INSTITUTE

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

Objectives

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

Administration

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

Organisation and Management

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

GOVERNING BODY

CHAIRMAN	
The Vice-Chancellor, University of Delhi (Ex-Officio) or a person nominated by him	**Prof. N.K. Ganguly** *(till 17.11.2009)* Former Director-General, I.C.M.R., New Delhi **Prof. P.N. Tandon** *(18.11.2009 onwards)* President, National Brain Research Centre Society,1, Jagriti Enclave, Vikas Marg Extn., Delhi - 110092
MEMBERS	
Treasurer, University of Delhi (Ex-Officio)	**Mrs Janaki Kathpalia**
Two members nominated by the Executive Council, University of Delhi	**Prof. 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 **Shri Debasish Panda** Joint Secretary **Dr R.K. Srivastava** Director General of Health Services
One member, not connected with the University, nominated by the Executive Council, University of Delhi	**Dr Satyajit Rath** Staff Scientist, National Institute of Immunology, Aruna Asaf Ali Marg, New Delhi-110067
One Professor of the Institute by rotation according to seniority for a period of one year	**Prof. Raj Kumar** *(till 02.11.2009)* **Prof. Ashok Shah** *(03.11.2009 onwards)*
One Reader or Lecturer of the Institute by rotation according to seniority for a period of one year	**Dr Malini Shariff** *(till 02.11.2009)* **Dr Mujeeb-ur-Rahman** *(03.11.2009 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

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

Prof. S.K. Bansal — *Member*
Department of Biochemistry
V.P. Chest Institute
University of Delhi
Delhi

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

Scientific Advisory Committee

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

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

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

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

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

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

Ethics Committee

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

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

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

Prof. Sanjai Bhatt — *Member*
Head, Department of Social Work
University of Delhi, Delhi

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

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

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

Dr D.N. Rao — *Main Nominee of CPCSEA*
Professor, Department of Biochemistry
All India Institute of Medical Sciences
Ansari Nagar
New Delhi - 110029

Dr Om Singh — *Link Nominee of CPCSEA*
National Institute of Immunology (in the event of non availability of
Aruna Asaf Ali Marg Dr D.N. Rao)
New Delhi - 110067

Ms Surbhi — *Nominee of CPCSEA*
J-189, Vikas Puri (Non Scientific Socially Aware
New Delhi - 110018 Member)

Dr (Mrs) Promodkumari — *Nominee of CPCSEA*
Professor, Department of Pharmacology (Scientist from outside the
University College of Medical Sciences Institute)
University of Delhi, Delhi-110095

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

ORGANISATIONAL STRUCTURE

DIRECTOR

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

Biochemistry

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

S.K. Bansal, MSc, PhD
Professor

Biostatistics

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

Cardiorespiratory Physiology

S.K. Chhabra, MBBS, MD
Professor

Clinical Biochemistry

Vishwajeet Rohil, MBBS, MD
Assistant Professor

Medical Mycology

(Mrs) Anuradha Chowdhary, MBBS, MD
Associate Professor

Microbiology

(Mrs) Mridula Bose, MBBS, MD
Professor

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

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

Pathology

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

Pharmacology

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

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

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

Physiology

K. Ravi, MSc, PhD
Professor

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

Respiratory Allergy and Applied Immunology

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

Balakrishnan Menon, MBBS, DMRD, MD
Associate Professor

M.K. Agarwal, MSc, PhD, FCAI
Re-employed Professor (up to 01.01.2010)

Respiratory Medicine

Unit - I

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

Director

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

Unit - II

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

Respiratory Virology

(Mrs) Madhu Khanna, MSc, PhD
Associate Professor

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

Library

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

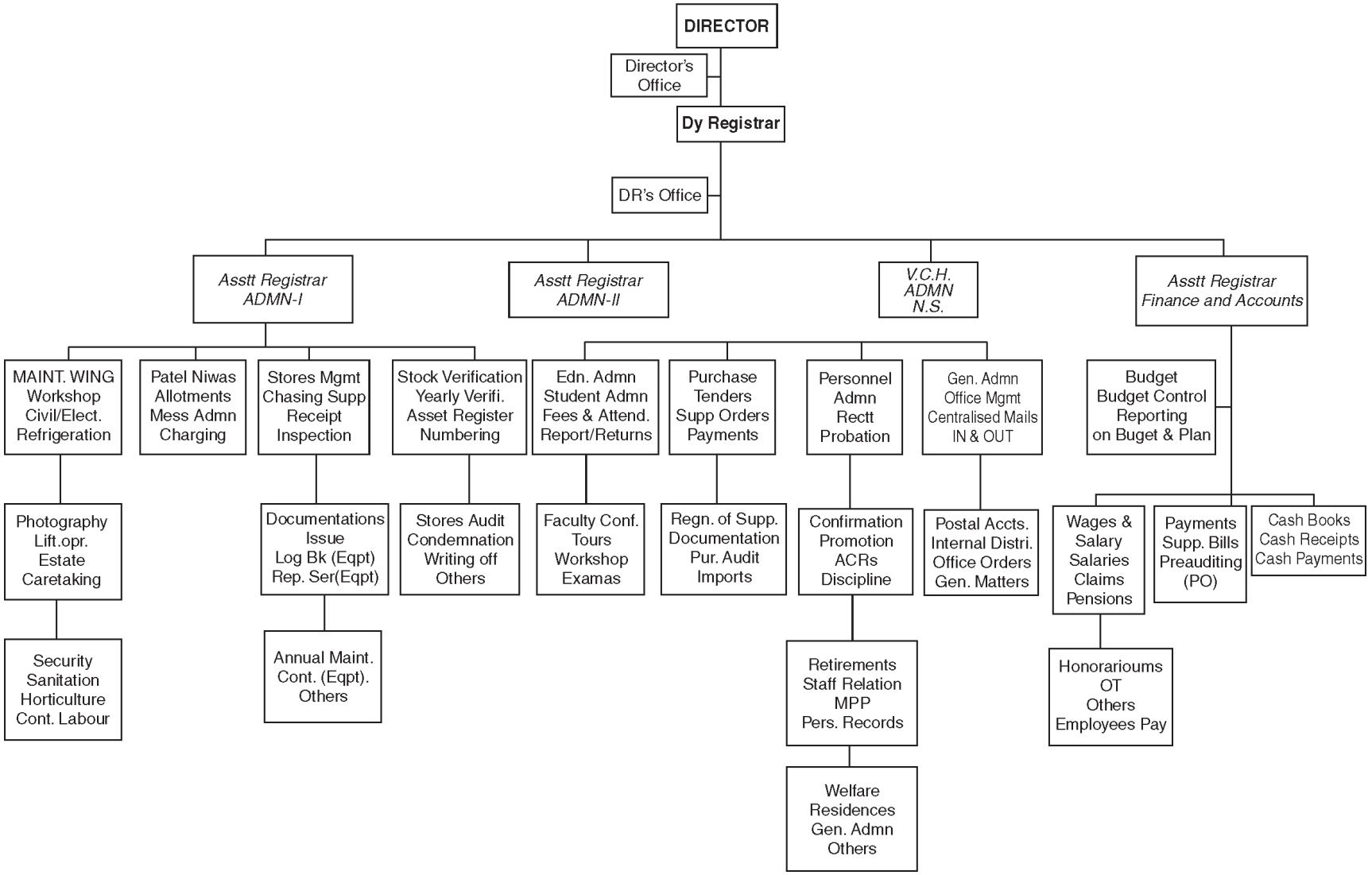
Animal House

Rajinder Bajaj, BVSc & AH
Veterinarian

Administration

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

ADMINISTRATIVE STRUCTURE



CENTRAL FACILITIES

Viswanathan Chest Hospital

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

1. Respiratory Medicine (Two units),
2. Respiratory Allergy and Applied Immunology,
3. Cardiorespiratory Physiology,
4. Radiodiagnosis and Imaging (including CT Scan Unit),
5. 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 2009-10, 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	:	10426
Number of visits of old patients to OPD	:	54386
Total		**64812**

Total number of indoor patients

General Wards	:	2266
Emergency Wards	:	1690
Total		**3956**

Emergency treatment provided	:	19529
Total number of patients treated in ICU	:	429
Invasive ventilation	:	95
Non-invasive ventilation	:	298
Intensive care	:	36

Number of specialised investigations done

Pulmonary function tests	:	20444
Arterial blood gases	:	2046
Bronchoscopy	:	261
Bronchoalveolar lavage	:	28
CT scans	:	2462
Ultrasound examinations	:	569

X-rays	:	20834
Electrocardiogram	:	5919
Polysomnograms	:	67
HIV testing	:	218
Serum IgE test	:	622
Skin tests	:	758
Clinical Biochemistry	:	26742

Tobacco Cessation Clinic

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

Nationa Yoga Therapy Centre

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

Cardio-pulmonary Rehabilitation Clinic

Cardio-pulmonary Rehabilitation Services at Viswanathan Chest Hospital, VPCI is involved in the management of chronic respiratory patients (Outdoor and Indoor), who are disabled in activities of daily living (ADL) due to shortness of breath (SOB), have muscle deconditioning due to chronic disease process and difficulty in bringing out phlegm/secretions from the airways. These patients are enrolled for rehabilitation programme where they undergo supervised exercise training and education sessions.

The programme 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. The training sessions include exercise training for lower and upper limbs, performed over separate sessions. Lower limbs training included leg-ergometry and treadmill walking. Training of the upper limbs included arm-ergometry and free weights. Simultaneous upper and lower limb training is performed on Semi-Recumbent Whole Body Exerciser. 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 attend supervised training sessions once or twice a week.

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

During the year 2009-10; 1408 patients (Outdoor and Indoor) were referred to Cardio-pulmonary Rehabilitation services. Chest Physiotherapy was done on 1361 patients; they were also explained breathing exercises and bronchial secretion drainage techniques. 47 patients enrolled for supervised rehabilitation programme out of which 34 patients successfully completed the course.

Patients for rehabilitation are enrolled in Cardio-pulmonary Rehabilitation OPD runs on every Tuesday and Friday from 2:00 P.M. – 4:00 P.M.

Animal House

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

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

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

Library

The Institute has one of the best libraries in the field of Pulmonary Disease and Allied Sciences having 9,893 Books, 19,889 bound Journals, 130 CD's, 458 Thesis and 97 National and International Reports. A total of 100 Journals (94 International and 06 National) are being subscribed by the library, 20 Journals (08 International and 12 National) are being received on exchange programme with the Institute's Journal and 33 Journals (09 International and 24 National) are received on complimentary basis. Library is also subscribing 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 University of Delhi from Monday to Friday [8.30 A.M. to.7.00 P.M.].

PUBLICATION DIVISION

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

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

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

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

DEPARTMENTAL ACTIVITIES

Biochemistry

Research

1. Molecular cloning, purification and characterisation of acetoxy drug: protein transacetylase from *Mycobacterium tuberculosis*

In our earlier investigations, we reported that transacetylase (TAase) activity was associated with glutamine synthetase (GS) of *Mycobacterium smegmatis*. The protein was named acetoxy drug: protein transacetylase (TAase). Further experiments established the TAase activity of the recombinant GS (rGS) of *Mycobacterium tuberculosis* (Mtb). TAase catalysed protein acetylation by a model acetoxy drug, 7, 8-diacetoxy-4-methylcoumarin (DAMC) was established by the demonstration of immunoreactivity of the acetylated target receptor protein such as glutathione-S-transferase (GST) with an acetylated lysine antibody. The specificity of the TAase of *M. tuberculosis* (MTAase) to various acetoxycoumarins was found to be in the order 7, 8-diacetoxy-4-methylcoumarin >7, 8-diacetoxy-3-decyl-4-methylcoumarin >7, 8-diacetoxy-3-hexyl-4-methylcoumarin >7-Acetoxy-4-methylcoumarin >7-acetoxy-3-decyl-4-methylcoumarin. The failure of the deacetylated product 7, 8-dihydroxy -4-methylcoumarin (DHMC) to inhibit GST activity in presence of Mtb GS further confirmed the TAase catalysed acetylation of GST. The specificity of various acetoxycoumarins towards TAase shows that acetyl group at C7 and C8 positions of coumarin ring are crucial for TAase activity. Further, these compounds were screened for their anti-mycobacterial activity. Several other analogs were also tested which led to the discovery of a lead molecule effective polyphenolic acetate (EPA) which may serve as a potent anti-tubercular drug candidate in the near future. Preliminary investigations have also suggested that the compound may work in synergy with standard first line anti-TB drugs. This may help in reducing the dose as well as consequent side effects of the standard drugs without compromising on efficacy. Further work is warranted to evaluate anti-tubercular activity of the aforementioned active compounds in Mtb infected animals.

2. Normalisation of deranged signal transduction in lymphocytes of COPD patients by the novel calcium channel blocker PRA-6

The investigations on the role of intracellular calcium ion concentration in the mechanism of development of COPD in smokers and non-smokers were carried out. The intracellular calcium levels were found to be increased in human lymphocytes in patients with COPD as compared to non-smokers and smokers without COPD. The investigations revealed the notable role of intracellular calcium ions in development of COPD by means of significant activation of protein kinase C and iNOS. The effect of a novel calcium channel blocker PRA-6 as a potential candidate for treatment in COPD was also investigated. PRA-6 treated cells showed a decrease in intracellular calcium level as compared to the untreated ones. Molecular studies were carried out to study the expression of isoforms of NOS in human lymphocytes of normal subjects and COPD patients. It was shown that PRA-6 downregulated the enhancement of iNOS in COPD along with reestablishing the normal level of eNOS. PRA-6 proves to be a potential candidate for treatment of COPD and useful in treatment of pulmonary hypertension.

3. QSAR studies on polyphenolic acetates as substrates for calreticulin transacetylase

We have earlier reported novel acetyltransferase function of calreticulin (CR), an ER luminal protein termed calreticulin transacetylase (CRTAase). CRTAase catalysed acetylation of receptor proteins such as glutathione S-transferase (GST) by polyphenolic acetates (PA), leading to irreversible inhibition. We have observed the concomitant acetylation of CR during the CRTAase catalysed reaction by PA. An elegant assay procedure for CRTAase was developed based on the inhibition of GST due to acetylation by PA. Utilising this assay procedure, a series of PA synthesised by us were evaluated for CRTAase activity, the kinetics parameters (K_m and V_{max}) were subsequently determined. The objective of the present study was to derive two different quantitative structure activity relationship (QSAR) models to define the structural requirements of PA necessary for CRTAase activity. The log of V_{max} / K_m was considered as biological activity. The geometries of the

structures of PA were optimised using PM3 method by Hyperchem 8.0. In the first QSAR approach descriptors were calculated for the molecular structures of PA using Cerius 2 software. The genetic algorithm (GA) and partial least square analysis (PLS) were used to select the descriptors and to relate the correlation between structural features and biological activities. An equation consisting of five descriptors were obtained and the model was both internally and externally validated by significant statistical values of r^2, q^2 (cross validation r^2) and scrambling/randomisation experiments. Secondly, a statistically significant 3D-QSAR analysis by comparative molecular field analysis (CoMFA) was carried out to study the structural features of the PA to account for the activity in terms of steric and electrostatic properties. Finally, the interaction of some potent PA with homology modeled structure of CR was analysed by blind docking method using Autodock programme, the best docked conformation were selected by refined docking method by GOLD and GLIDE programmes. The results of the QSAR analysis confirmed the experimentally established specificity of CRTAase to various classes of PA. The results of QSAR and docking studies validated each other and provided insight into the structural requirements for PA-CR interaction. The interaction of PA with lysine residue (Lys 189) in the P-domain of CR was also confirmed from the computational docking studies.

4. Protein acyltransferase function of purified calreticulin: an exclusive role of P-domain in mediating the protein acylation utilising acyloxy coumarins and acetyl-CoA as the acyl group donors

Our earlier studies proposed that the CR purified from various sources (rat, buffalo, and human placenta) had the ability to transfer acetyl group to receptor proteins (RP) such as GST, utilising DAMC as the acetyl group donor. Hence, CR was designated as calreticulin transacylase (CRTAase). Our recent publication highlighted that purified recombinant CR of *Haemonchus contortus* (rhCR) also had the ability to catalyse the propionylation of recombinant GST of *Schisstoma japonicum* (rGST) utilising propoxycoumarin as a substrate, which was confirmed by the immunobloting and LC-MS/MS analysis. The nanoscale LC-MS/MS analysis identified the propionylation sites on three lysine residues: Lys-11, -180 and -181 of rGST. These results highlighted the transacylase function of CRTAase and provided a tacit proof for CR as a 'transacylase' rather than 'transacetylase' alone. The documentation on CR domains largely was confined to the elucidation of their role in Ca^{2+} homeostasis resorting to transfected CR deficient cells bearing a combination of the domains. The current study for the first time dealt with the isolated and purified CR domains of *Haemonchus contortus* in order to examine their ability to exhibit CRTAase activity. P-domain of rhCR unlike N and C domains was found to be endowed with CRTAase function. We have also observed for the first time acetyl CoA, the universal biological acetyl group donor, as substrate for rhCRTAase/P-domain mediated acetylation of rGST. rGST, thus, acetylated was found to positively interact with anti-acetyl lysine antibody. Also, the nanoscale LC-MS/MS analysis identified the acylation sites on lysine residues of rGST. P-domain catalysed acetylation of rGST resulted in the modification of several lysine residues in common, when either DAMC or acetyl CoA was used as the acetyl group donor. We have also demonstrated rhCRTAase/P-domain could catalyse the transfer of propionyl group to rGST utilising propoxycoumarin as the propionyl group donor. These results highlighted that the active site for the CRTAase activity would reside in the P-domain of CR. Certain ER proteins are known to undergo acetylation under the physiological conditions involving acetyl CoA. CRTAase mediated protein acetylation by acetyl CoA as described above may hint at CR as the possible protein acetyltransferase of the endoplasmic reticulum. Further, the work is in progress on the site directed mutagenesis of the auto-acetylated residues of P-domain (lysine 206, 207 and 209) to decipher the active site responsible for this transacylase function.

5. Characterisation of 6-acetoxyquinolone and as an effective antiplatelet agent

We have studied earlier a membrane bound novel enzyme acetoxy drug: protein transacetylase identified as calreticulin transacetylase (CRTAase) that catalysed the transfer of acetyl groups from polyphenolic acetates (PAs) to the receptor proteins and thus, modulating their biological activities. Current studies conducted by us, reported for the first time that acetoxy quinolones (AQs) are endowed with antiplatelet action by virtue of causing CRTAase mediated activation of platelet nitric oxide synthase (NOS) by way of acetylation leading to the inhibition of ADP/Arachidonic acid (AA)-dependent platelet aggregation. The correlation of specificity of platelet CRTAase to various analogues of AQs with intracellular NO and consequent effect on inhibition of platelet aggregation was considered crucial. Among AQs screened, 6-AQ (6-acetoxyquinolin-2-one) was found to be the superior substrate to platelet CRTAase and emerged as the most active entity to produce antiplatelet action both *in vitro* and *in vivo*. 6-AQ caused the inhibition of cyclooxygenase-1 (Cox-1) resulting

in the down regulation of thromboxane A2 and the inhibition of platelet aggregation. Structural modification of AQs positively correlated with enhancement of intracellular NO and antiplatelet action.

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

Lipid rafts are composed of sphingolipids and cholesterol. They are small platforms, present in the exoplasmic leaflet of plasma membrane. Any change in their lipid composition may lead to the changes in the orientation of the cell surface receptors which may affect its functions that may lead to pathophysiology and ultimately the manifestation of the disease. Bronchial asthma is triggered by stimuli, many of which act through the cell surface receptors. The change in composition of lipids of lipid rafts may therefore cause receptor dysfunction causing manifestation of asthma.

Our present study had shown that in bronchial asthma, there was no change in the total erythrocytic counts as compared to the healthy subjects. The changes in protein contents and phospholipids suggested a reciprocal metabolic relationship in the two molecules in the disease. An increase in sphingomyelin and PI and a decrease in PC, PE and PS and neutral lipids, besides a fall in the ratio of cholesterol: sphingomyelin and an increase in cholesterol: PE ratio, suggested a compositional change in the lipid raft molecules in erythrocyte membrane in asthma. There was an increase in caprylic acid in phospholipids which suggested tight packing and increased rigidity of the plasma membrane in asthma. There was a significant increase in phospholipases A_2, PLC and sphingomyelinase in asthmatic erythrocyte membrane which suggested an increase in the formation of arachidonic acid and ceramide, the molecules known to play a direct role in inflammation. The increase in arachidonic acid and ceramide in the membrane might be responsible for the persistent airway inflammation in the lungs, which is a characteristic feature of asthma. Taken together, the study suggests that in bronchial asthma, there are changes in composition of lipids of the rafts, which may change their structure as well as functions, particularly transmembrane signalling that may impair or modify the response of the cells to the triggers (stimuli) of asthma, which may be the cause of development of the pathophysiology and the manifestation of the disease.

7. 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 this study, we developed the experimental model of asthma by sensitising the guinea pigs with ovalbumin. Our experiments revealed day 9 to be the day of onset of the airway and dermal hypersensitivity which was optimally present on day 14 as compared to the controls. The findings revealed that the guinea pigs in the experimental group after challenge with the ovalbumin solution, developed airway inflammation, airway remodelling, hyper mucus secretion, etc. There was an increase in protein kinase C (PKC) activity and its isoenzymes PKCα and ε on day 9 which further increased on day 14 in airway smooth muscles and lymphocytes in the sensitised group. PKC activity depends upon the second messengers, *viz.*, diacylglycerol (DAG) and inositol triphosphate (IP3), which are produced by the membrane phosphoinositides after receptor activation. There was no change on day 0, in the total phosphoinositides (PI, PIP, and PIP_2) pool in control and experimental groups. But on day 9, the total contents of the phosphoinositides (PI, PIP, and PIP_2) were significantly increased in experimental ASM and lymphocytes. On day 14, PIP, PI and PIP_2 in experimental ASM and lymphocytes further increased, which would have led to the activation of PKC on the onset of the airway hyperreactivity. The active PKC on the day of initiation, then caused increase in the phosphorylation of 82, 47 and 35 kDa proteins. The increased phosphorylation of 82 kDa protein may represent the autophosphorylation of PKCα which might activate the downstream signalling and phosphorylate the proteins of 47 and 35 kDa. The phosphorylation of 47 kDa may be associated with increased oxidative stress in ASM and lymphocytes, leading to release of inflammatory mediators and onset of the inflammation. The 35 kDa protein in B lymphocytes are known to be CD20 proteins, which forms the integral part of the membranes and are the substrates of PKC. It is possible that the increased phosphorylation of the 35 kDa protein in ASM may inhibit the inflammatory potential of these proteins leading to onset of inflammation as observed in this study. The sustained activation of PKC suggested a sustained and increased phosphorylation of these proteins which was observed on day 14, which represented full development of the disease.

The increase in protein kinase C (PKC) activity clearly demonstrated the activation of PKC mediated pathway in the aetiopathogenesis of asthma, which is abnormally activated during the onset of airway

hypersensitivity and may therefore play an important role in the regulation of the airway smooth muscles contraction and activation of lymphocytes. The activated PKC may activate airway mucus secretion and inflammatory cells, such as lymphocytes, to release inflammatory mediators, which may lead to the onset, development and perpetuation of the airway hypersensitivity and inflammation in animal model, which are the characteristic features of asthma.

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

A study to develop reference values for spirometric parameters in children in Delhi region was completed. The study was funded by the Indian Council of Medical Research. Nearly 700 children in the age group 6 to 18 years were included. A questionnaire was answered by the parents and the children were examined to ensure that they were free of any respiratory or other systemic disease. Spirometry was carried out on a portable spirometer using a Lily Pneumotach as per the standardisation guidelines of the American Thoracic Society-European Respiratory Society. FVC and FEV_1 were found to increase linearly with age and height. Multiple linear regression analysis is being carried out to develop the regression equations.

Development of robust regression equations with a standardised methodology will be of immense value in research and in clinical practice including diagnosis and management of respiratory diseases such as bronchial asthma. This study will also provide inputs to manufacturers to include these as prediction equations in equipment software.

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

This study has been funded by the Indian Council of Medical Research. Four centers have been selected to develop regression equations for spirometric parameters, lung volumes and diffusion capacity. These are as follows: North (Delhi), South (Bangalore), East (Kolkata) and West (Mumbai). 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. Similar spirometers are being used at the four centers. Similar methodology as per the standardisation guidelines of the American Thoracic Society-European Respiratory Society is being used at all the centers. So far, nearly 125 subjects have been studied in Delhi.

3. Cardiac autonomic dysfunction in chronic obstructive pulmonary disease

Patients with chronic obstructive pulmonary disease (COPD) are more likely to die of cardiovascular than respiratory causes. There is some evidence of autonomic dysfunction in COPD. The picture of the abnormalities of ANS in COPD (extent and direction of imbalance between sympathetic and parasympathetic systems) and its relationship with severity of COPD is unclear.

A study was carried out in 39 subjects with COPD and 11 normal controls to examine the above issues. It was found that there was a spectral distribution of power towards the higher frequency indicating a preserved or increased parasympathetic modulation of heart rate at rest. However, after submaximal exercise on a cycle ergometer, there was a reduced heart rate recovery indicating a suppressed parasympathetic drive or a sustained sympathetic drive. The patients used their chronotropic reserve poorly. The study indicates that under conditions of stress such as exertion, the parasympathetic function is poor exposing the patients to the adverse consequences of an overactive sympathetic system.

Clinical Biochemistry

Research

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

Cancer is a genetic disease initiated by alterations in genes, such as oncogenes and tumour suppressors that regulate cell proliferation, survival, and other homeostatic functions. In cancer cells, genes are either modified by mutations, which alter the function of the proteins they encode, or through epigenetics *i.e.*, modifications to chromosomes that alter gene-expression patterns. This can occur *via* DNA methylation as well as through acetylation, methylation or phosphorylation of Histones and other proteins around which DNA is wound to form chromatin. Imbalance of acetylation and deacetylation levels results in development of malignancies. Protein acetylation in cells is regulated by a coordinated action of histone acetyl transferases (HAT) and histone deacetylases (HDAC) that ensures the maintenance of homeostasis and execution of activities related to damage response *viz.*, DNA repair, cell cycle delay, apoptosis and senescence. Elucidation of the relative roles of HAT/HDAC mediated acetylation by the novel mechanism *viz.*, a Calreticulin Transacylase. (CRTAase) mediated acetylation in cell function under a variety of stress conditions would hold key to the design of drugs targeting protein acetylation system. As histone proteins are known to be acetylated by HAT (histone acetyl transferase) by Acetyl-CoA dependent enzymatic acetylation mechanism. Hence it was thought interesting to see whether histone proteins can be acetylated by CRTAase mediated Acetyl-CoA independent mechanism which is a novel concept and its effect on apoptosis in the tumour cells is currently being investigated in our lab in an effort to explore the significance of polyphenolic acetates (PAs) and CRTAase as potential candidates intended for their use as target oriented chemotherapeutic and chemopreventive drugs acting by the proposed novel mechanism.

We have obtained purified recombinant calreticulin from clones from the nematode *Haemonchus contortus*, GI parasite in sheep and goat using various steps involving preparation of media, inoculation, induction, sonication and affinity chromatography (Ni-NTA slurry) by Elution with different conc. of imidazole and assessed its purity by and SDS-PAGE and Western blot. We have established the transacetylase activity of calreticulin *in vitro* by glutathione S tranferase assays (Inhibition of GST). We further intend to assay CRTAase in human non-small cell lung cancer A549 cell line culture tumour cells and CRTAase catalysed modification of histone by various combinations of PAs (ellagic acid peracetate, querecitin pentaacetates, 6-acetoxy quinolone and 7, 8-diacetoxy-4-methyl coumarin (DAMC)) and valproic acid as HDAC inhibitor. Apoptosis studies will be carried out by florescent microscopy and flow-cytometric analysis. Extent of histone protein acetylation will be determined by Western blotting using commercially available specific anti- acetyl histone (Ac-Lys) H3 and H4 Antibodies. Similar *in vivo* studies will also be carried out in the ehrlich ascites tumor (EAT) cell lines in mice.

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

Chronic obstructive pulmonary disease (COPD) is characterised by airway obstruction and destruction of lung tissue. Wide consensus exists as to its cause: smoking of tobacco. Nearly 90% of COPD is caused by long term cigarette smoking; however, only 25% of chronic tobacco smokers develop COPD. But why do only 25% of long-term smokers develop COPD, when others do not? It appears that smokers who acquire COPD may have a different genotype than those lifelong smokers in whom lung function declines at a slower pace or not at all. Polymorphisms in metalloproteinases genes, ADAM33, MMP1, MMP9 and MMP12 and their association with smoking and COPD studies are under investigation in the undergoing project, primers are designed using appropriate software and initial studies have been done using gene runner programme. Quantification of various metalloproteinases in COPD and smokers will be done by Western blot and ELISA techniques using specific antibodies. Identification of single nucleotide polymorphisms (SNPs) in the genes encoding various metalloproteinases linked to COPD susceptibility in smokers will be carried out by PCR and DNA sequencing and the association of various SNPs, gene products, smoking and COPD will be studied.

Diagnostic Services

Diagnostic services were provided to the indoor and outdoor patients to the Viswanathan Chest Hospital of the Institute. Supervision of the clinical biochemistry investigations was done and all the samples were analysed by the fully automated Beckman Coulter Synhron CX-5 Pro and Alfa Wassermann *Autoanalysers*.

Medical Mycology

Research

1. Evaluation of hypertonic Sabouraud glucose agar as a reliable medium for differentiation of *Candida dubliniensis* from *Candida albicans*

C*andida dubliniensis* is an opportunistic yeast pathogen, likely to be misidentified as *Candida albicans* because of its close phenotypic resemblance. Although *C. dubliniensis* has been reported world-wide, mostly from cases of oral candidiasis in HIV-positive patients, it is emerging as an aetiologic agent of systemic disease in HIV-negative individuals with an estimated prevalence below 5%. Both of the species produce germ tubes, form chlamydspores and exhibit similar carbohydrate assimilation profiles, leading to an underestimation of the prevalence of *C. dubliniensis* in clinical samples. Molecular methods such as PCR, no doubt provide accurate identification but most of the clinical mycology laboratories, especially in developing countries, have no access to these techniques. Consequently, a simple and inexpensive phenotypic test to identify *C. dubliniensis* would be highly useful**.** We have evaluated hypertonic Sabouraud glucose agar with 6.5% NaCl for differentiation of *C. dubliniensis* based upon its inhibition on this medium. The test fungi included 84 isolates of *Candida albicans*, 18 *C. dubliniensis* and 2 reference strains each of *C. albicans* (ATCC 76615, ATCC 90028) and *C. dubliniensis* (CD 36, CBS 7987). Identity of the test yeast isolates was verified by germ tube test, chlamydospore formation on Tween 80 rice agar, and carbohydrate assimilation profiles determined by ID 32C kit (bioMérieux). This was confirmed by a diagnostic PCR which targets the novel *C. dubliniensis* group I intron in the large ribosomal subunit. Also, chlamydospore formation on Staib's niger seed agar and growth at 45 ^{0}C on Sabouraud glucose agar (SGA) were tested in all of the isolates. The test yeasts and the reference strains were inoculated on hypertonic SGA slants incubated at 28 ^{0}C. All of the *C. albicans* isolates grew on hypertonic SGA contrary to the consistently negative results with the 20 *C. dubliniensis* isolates. In strong contrast, chlamydospore formation on Staib agar yielded 10 (11.9%) false postive results, and 88% of the test *C. albicans* isolates showed false negative results at 45 ^{0}C. We conclude that hypertonic SGA with 6.5% NaCl can be used as a reliable, inexpensive medium for routine differentiation of *C. dubliniensis* from *C. albicans*.

2. Antifungal susceptibility profile and molecular typing of clinical and environmental isolates of *Cryptococcus neoformans* and *Cryptococcus gattii* from India

Cryptococcosis is an invasive fungal infection, caused by encapsulated yeast species *C. neoformans* and *C. gattii*. During 2009, we investigated the *in vitro* antifungal susceptibility of the clinical and environmental isolates of both of these pathogens. Three hundred and eight isolates, comprising 246 *C. neoformans* var *grubii* and 62 *C. gattii* (serotype B) originating from clinical and environmental sources were included in the study. Of the 246, *C. neoformans* var *grubii* isolates, 160 were clinical originating from 130 patients and the remaining 86 were environmental. Among the 62 *C. gattii* isolates, 60 were environmental and two were clinical. The clinical isolates had been received during 2002-2009 from various hospitals in the Union Territories (UT) of Delhi and Chandigarh, and the states of Uttar Pradesh and Himachal Pradesh. One hundred and forty out of 162 clinical isolates (86%) originated from CSF, 11 from blood, 7 from sputum, 3 from urine and one from endotracheal secretion. Of these, 109 isolates were obtained from initial clinical specimens of patients with cryptococcosis whereas 53 were repeat isolations (2 or more isolates from an individual patient collected at least one month apart) after the patients had been treated with amphotericin B or fluconazole. The number of isolates obtained from HIV-positive patients was 116 (70%) whereas 21 isolates (11.3%) were from HIV-negative patients. The HIV status of the patients yielding the remaining 25 isolates of *C. neoformans* var *grubii* was unknown.

Among the 146 environmental isolates, 86 were *C. neoformans* var *grubii* and 60 of *C. gattii* (serotype B). They had been collected and stocked during our investigation of decayed wood inside trunk hollows of a wide spectrum of tree species and of soil samples in proximity to the base of some of the positive trees. Also, included were 8 reference strains from global fungal culture collections. These were *Cryptococcus neoformans* (serotype A) ATCC 90112, *C. gattii* (serotype B) CBS1930, CDC 3175 (Centers for Disease Control and Prevention, Atlanta, U.S.A,), *C. gattii* (serotype B) B4495, B4499 and *C. gattii* (serotype C) B4546, JF 109, JF 101 (McMaster University, Hamilton, Ontario, Canada).

Identification of the test isolates of *C. neoformans* var *grubii* and *C. gattii* was confirmed by verification of salient phenotypic features as per standard mycological procedures. Besides, serotype identification of the isolates was confirmed by PCR method using $(GACA)_4$ and M13 phage as a single primer.

In vitro antifungal susceptibility testing was determined by the broth microdilution method (CLSI, formerly NCCLS, M27-A3). The antifungals included amphotericin B (Sigma, St. Louis, Mo, USA), fluconazole, voriconazole (Pfizer, Groton, CT), itraconazole (LeePharma, Hyderabad, India), and 5-flurocytosine (Sigma). Drug dilutions of each antifungal agent were prepared with RPMI 1640 medium with glutamine without bicarbonate (Sigma) buffered to pH 7 with 0.165 M 3-N-morpholinepropanesulfonicacid (Sigma). The drug dilutions were dispensed in 96-well microdilution plates, sealed and frozen at -70 ^{0}C until needed. The final concentrations of the drugs were 0.12-64 µg/ml for fluconazole and 0.03-16 µg/ml for amphotericin B, itraconazole and voriconazole. The yeast inoculum was adjusted to a concentration of 0.5-2.5x10^3cells/ml in RPMI medium as measured by spectrophotometer, and an aliquot of 0.1 ml was added to each well of microdiluution plate. Drug-free and yeast-free controls were included and microplates were incubated at 35 ^{0}C for 48-72 h. CLSI recommended quality control strains, *Candida krusei*, ATCC 6258, and *Candida parapsilosis*, ATCC 22019, were used with each test. The MIC end points were read visually after 48 and 72 h and defined for fluconazole, voriconazole, itraconazole and 5-flurocytosine as the lowest drug concentration that caused a prominent decrease in growth (50%) *vis-a'-vis* the controls. For amphotericin B, the MIC was defined as the lowest concentration at which there was 100% inhibition of growth compared with the drug-free control wells. Statistical differences between MIC values were assessed, using Mann-Whitney test. Statistical significance was defined as P-value < 0.05. Statistical analyses were performed with GraphPad Prism version 5.00 (GraphPad Software, San Diego, CA,USA).

All the test isolates barring 2 clinical *Cryptococcus neoformans* var *grubii* isolates which were resistant to 5-flurocytosine (MIC>64µg/ml) were susceptible to all the antifungals tested. A comparison of the Geometric means (GM) of MICs revealed that *C. gattii* (serotype B) showed significantly reduced susceptibility compared with *Cryptococcus neoformans* var *grubii* to fluconazole (6.99 *versus* 2.61 $p<0.05$), itraconazole (0.24 *versus* 0.11 $p<0.05$) and voriconazole (0.14 *versus* 0.05 $p<0.05$). Also, MIC_{90} of *C. gattii* was twofold higher as compared to *Cryptococcus neoformans* var *grubii* for fluconazole (8 *versus* 4), itraconazole (0.5 *versus* 0.25) and voriconazole (0.25 *versus* 0.12). However, no statistically significant difference in the susceptibility of the two *Cryptococcus* species was observed against amphotericin B and 5-flurocytosine. A comparison of GMs of environmental and clinical *Cryptococcus neoformans* var *grubii* isolates revealed that environmental *Cryptococcus neoformans* var *grubii* isolates exhibited significantly reduced susceptibility to fluconazole (3.63 *versus* 2.2 $p<0.0001$), itraconazole (0.141 *versus* 0.09, $p <0.0001$) and 5-flurocytosine (3.78 *versus* 1.45 $p<0.0001$).

A comparison of GM of MICs of *Cryptococcus neoformans* var *grubii* (GM 0.05) and *C. gattii* (0.14) against voriconazole revealed it to be most potent among the azoles tested. Likewise, none of the isolates tested for voriconazole belonged to susceptible dose dependent category (SDD). The MICs of isolates against fluconazole showed a broad range for both *Cryptococcus neoformans* var *grubii* (0.5-8) and *C. gattii* serotype B (1-16); here 4 environmental isolates of *C. gattii* belonged to SDD category. In strong contrast, itraconazole MICs against both the species revealed a large number of isolates in the SDD category *i.e.*, 95% of *C. gattii* serotype B and 14% of *Cryptococcus neoformans* var *grubii*. AFST revealed that primary resistance against the antifungals amphotericin B, 5-fluorocytosine, fluconazole, voriconazole and itraconazole was a rare occurrence in clinical and environmental isolates of *C. neoformans* var *grubii* and *C. gattii*, serotype B, and that *C. gattii* was significantly less susceptible than *C. neoformans* to azoles.

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 1972 clinical specimens were processed during the year. These included 1090 sputa, 607 blood specimens, 245 bronchial lavage/aspirate/washings, 10 pleural fluid, and 20 miscellaneous (nasal discharge/washings/skin scrapings/swabs/urine/CSF/endotracheal secretions/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

The study aims to investigate the influence of host genetic factors on the variability of clinical presentation of 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. We collected a total of 113 samples of blood for serum cytokineestimation and genotyping for single nucleotide polymorphism (SNP) analysis. 69 patients suffering from pulmonary tuberculosis (PTB) and 44 healthy age matched controls. DNA was extracted by phenol-chloroform method. The quality of DNA was checked by agarose gel electrophoresis and concentration determined by nanodrop. DNA was genotyped using sequenom platform. Genotype data of the SNPs in the chosen cytokine genes analysed by calculating genotype and allele frequencies of the SNPs for the patients as well as healthy controls. The genotype frequencies and minor allele frequencies of many SNPs of the PTB patients and the healthy individuals were not significantly different. But some SNPs such as rs2229094, rs2239704 {TNF-β}; rs2069718 {IFN-γ}; rs3212227, rs3213094, rs3213097, rs730690, rs3212220, rs2853694 {IL-12B}; rs2070874, rs2227282 {IL-4}; rs419598 {IL-1RA}; rs1143630, {IL-6} rs1554606, rs795467{IL-8}; rs2243266 {IL-1B} show the tendency of difference. The case and control were matched with the population of IGVDB using EIGENSTRAT, a statistical tool, and the concordance was seen with the Indo-European population as samples were collected from TB centres in Delhi where cases come from Delhi and adjoining areas. The data from ~450 controls from IGVDB are now also included in the analysis and an attempt to correlate the aforementioned polymorphism with risk of disease outcome is being probed.

Cytokine assays were done using ELISA and an attempt was made to correlate the cytokine levels with the genotypes obtained for various polymorphism found in cytokine genes. Significant association was seen for certain rsIDs when genotypes were compared separately in healthy controls (HC) and PTB patients. All analysis was done using one-way ANOVA with Bonferroni using GraphPad Prism version 4.00 for Windows, GraphPad Software, San Diego California USA, <www.graphpad.com>.

For TNF-α rsID 3093362, the serum cytokine level varied significantly between genotypes with AA genotype being higher producer in PTB ($p<0.05$) as compared to GG genotype but when compared to GA genotype no significant association was seen($p>0.05$) but in HC, AA genotype was higher producer ($p<0.01$) as compared to both GA and GG genotype ($p<0.01$). No other statistically significant observation was seen for most of the polymorphisms of genes namely IFN-γ, IL-10, IL-4, But a trend was observed in all of these with a certain genotype being higher producer as compared to others in both PTB and HC. A more common observation seen was that the heterozygous genotype was higher producer of the cytokine in HC as compared to PTB of the same polymorphism.

For IL-12 rsID3213094, the serum cytokine level varied significantly in PTB where AA genotype was higher producer ($p<0.05$) as compared to GG genotype but when compared to GA no significant difference was seen but for HC GG genotype was higher producer followed by AA and GA genotype but the observation was not statistically significant. This correlation of varied genotypes producing different level of the cytokine may well be influencing the outcome of infection and disease in tuberculosis. A larger data size will be needed to validate these observations.

2. Cholesterol transport and *mce4* operon

It has been proposed that cholesterol derived from host tissues are utilised by *M. tuberculosis* to survive under nutrition deprived condition such as inside a caseation necrosis in the dormant state. In recent years a number of reports have appeared to indicate that the proteins encoded by the *mce* operon genes may have some role in transport of cholesterol. It has been suggested that the proteins of the *mce4* operon may operate as a major cholesterol import system in *M. tuberculosis* as strains lacking *mce4* operon exhibit drastically reduced ability to take up and metabolise cholesterol *in vitro* and hence grow poorly when cholesterol is the primary source of carbon.

In our laboratory, we examined the role of *mce4A* gene of *mce4* operon in cholesterol uptake by *M. tuberculosis*. For this purpose, the functional characterisation of *mce4A (*Rv3499c*)* gene of *mce4* operon and *mce1A* gene (Rv0169c) of *mce1* operon was performed. Firstly, both aforesaid genes were cloned in pVV16 vector and over-expressed in *M. tuberculosis*. We have also confirmed its identity by using of anti-His antibody and further purified the recombinant *mce4A* and *Mce1A* proteins. Purified proteins were used for cholesterol binding assay. Preliminary results demonstrate considerable binding activity of the radiolabelled cholesterol with recombinant *mce4A* protein. This observation will be validated by further detailed analyses.

3. Functional analysis of the mammalian cell entry (*mce4A*) gene of *M. tuberculosis* H37Rv using antisense approach

The *mce1A* gene is found to be responsible for mammalian cell entry and intracellular survival of *M. tuberculosis*. As this gene is present in an operon structure, its transcription is coupled with other genes of the operon. Knockout strategy to study function of a single gene with such an arrangement may not provide specific information about that gene. In the present study, we used antisense approach to study the function of *mce4A* (Rv 3499c) gene by creating an antisense for this gene. In the first set of experiments we demonstrated that antisense for *mce4A (Rv 3499c)* expressed by a constitutive promoter could block the expression of *mce4A* protein in *E.coli*. Thereafter, antisense plasmid was electroporated in *M. tuberculosis* and expression of *mce4A* protein was analysed by Western blotting. As *mce* proteins are surface exposed and *mce4A* is localised in cell wall fraction, a >50% reduction in expression of *mce4A* protein was detected in the pellet fraction of *M. tuberculosis* pSD5-4AS (*mce4A* antisense expressing strain) cell lysate. We assessed intracellular survival ability of *mce4A* (pSD5-4AS) mutant and also of *mce1A* mutant (pSD5-1AS) in comparison to *M. tuberculosis* harbouring vector alone (pSD5) using macrophage cell line. We observed a reduced survival of *mce4A* mutant at all time points tested; maximum reduction was observed at 48 hrs post infection. Thus, blocking of single *mce4A* gene reduced the bacterial survival inside THP-1 human macrophage cell line. Expression analysis of nine other virulence associated genes was also performed in order to examine possible effect of *mce4A* antisense on expression of these genes. The *prrA* (Rv0903c), a response regulator of a two component system was not expressed in *M. tuberculosis* pSD5-4AS strain. The possible regulatory effect of *mce4A* antisense is under further investigation.These findings led us to conclude that *mce4A* gene is implicated in intracellular survival and antisense strategy is useful to study function of a gene in an operon.

4. Functional analysis of *lprN* gene (Rv3495c), a putative lipoprotein of *mce4* operon of *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. Since all the 4 *mce* operons contains one *lpr* gene each it was interesting to understand the significance of the presence of these genes in *M. tuberculosis* genome. *lprN* gene is present in the *mce4* operon. Since we established the cell entry function of this operon (BMC Microbiology, 2008), we took up the *lprN* gene which is part of the *mce4* operon for detailed study. The present study was initiated to understand the functional relevance of the putative lipoprotein encoded by the *lprN* gene of *mce4* operon of *M. tuberculosis*. The *lprN* gene was cloned and expressed. The protein was purified and used for further animal experiment to assay the immunogenic potential of the recombinant *LprN* protein.

The mice (BALB/C) were injected subcutaneously two or three times at two weeks intervals with 50 µg of the recombinant and purified *LprN* protein emulsified in Freund's Incomplete Adjuvant. Control mice were injected with saline. Four weeks after last immunisation, mice were sacrificed and proliferation of T cells was studied. In comparison to control mice, a significant amount of stimulation index (SI=3.5) ($p<0.001$) was observed when mice were immunised with purified *LprN* protein and re-stimulated the spleen cells from the mice with 100ng of *LprN* protein *ex vivo*. Moreover, significant levels of nitric oxide and TNF-α were also produced by the splenocytes of mice immunised with *LprN* protein. However, the production of IFN-γ was at the basal level as compared to control mice. The possible role of the *LprN* lipoprotein in protective immune response against tuberculosis will be studied by challenging the immunised mice with *M. tuberculosis* H37Rv.

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

Conventional serotyping using pneumococcal antisera: This was carried out using the latex agglutination assay. Latex beads coated with pools of pneumococcal antisera were used for the test. Fifty-four samples

have been tested. It identified the serotypes 1(7), 19(10), 9 (1), 11(2), 14 (4), 3(1), non-vaccine types (11) and untypable (18).

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

Direct detection of Streptococcus pneumoniae in clinical samples using two-step PCR: Direct detection of *S. pneumoniae* was carried out in 177 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 177 samples tested 69 were positive by PCR.

6. Detection and characterisation 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.

Of the four tests used, inhibitor based detection test is the easiest to perform, has 100% sensitivity and 96% specificity and hence, should be the first choice of phenotypic tests for detecting AmpC producing isolates.

Polymerase chain reaction (PCR): PCR was carried out on all the screen positive isolates. Out of 75 screen positive isolates of *Klebsiella* spp., PCR showed 20 isolates were harboring *ampc* gene, out of which 14 isolates were of CIT family whereas, 6 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 5 belonged to EBC family.

Nucleotide sequencing of PCR positive AmpC isolates: The sequence of CIT family encoding genes in 20 isolates of *E. coli*, 13 isolates of *K. pneumoniae* and 2 isolates of *K. oxytoca* showed 100% homology with CMY-2 gene. EBC family encoding genes of 5 isolates of *E. coli* and 7 isolates of *K. pneumoniae* showed 100% sequence homology with ACT-1 gene.

Pulsed field gel electrophoresis (PFGE): PFGE was performed on 18 *E.coli* and 14 *Klebsiella* isolates, which were representative of the AmpC types CIT and ACT/MIR-1 as identified by PCR. Only 3 isolates, EC 138, EC 114 & EC 130 showed homology (86%-94%) similarity by the UPGMA cluster method. There was no correlation seen among the 3 isolates with hospital from where they were isolated, the year of isolation or the type of AmpC produced.

7. 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 nonsusceptible 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.
b. Combined disk test.

c. Double disk synergy test.
d. Extended EDTA disk synergy test.
e. EDTA-Imipenem microbiological (EIM) assay.

Modified Hodge test detected the maximum number of isolates to be a MBL producer, followed by EIM assay. Double disk synergy test detected the minimum number of isolates to be a MBL producer and hence is not a sensitive test.

Polymerase chain reaction (PCR): PCR was carried out on all the screen positive isolates. PCR detected *bla* VIM gene in 76 isolates.

Nucleotide sequencing of PCR positive isolates: All the PCR positive isolates were selected for nucleotide sequencing of the MBL gene. Nucleotide sequencing of the PCR amplicons was carried out by dideoxy-chain termination method using the services of commercial vendor. The nucleotide sequences obtained were analysed with the software available at the website of the National Center for Biotechnology Information (http://www.ncbi.nlm.nih.gov). The sequence of blaVIM encoding gene in 97 isolates showed 100% homology with blaVIM-2. The sequence of blaIMP encoding gene in one isolate was 100% homologous to blaIMP-1 while; in the other isolate it showed 100% homology with blaIMP-13. The blaGIM-1 encoding gene detected in a single isolate showed 81% sequence homology with blaGIM-1 of accession number AJ620678.

8. Hospital infection control surveillance

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

9. PCR restriction analysis in early identification of *M. tuberculosis* from clinical samples

We have applied PCR-restriction fragment length polymorphism (PRA) technique for early detection and identification of *M. tuberculosis* directly in cultures and clinical samples. *Hsp65* PRA based on the methodology of Wong *et al* was applied on the DNA extracted directly from the sputum samples. The protocol could detect down to 100 organisms/µl. PRA was found to be a simple and reproducible method for early detection of *M. tuberculosis* from sputum samples. We have also attempted to look for novel restriction enzymes to develop a PCR restriction analysis assay which could be used as a screening assay.

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 confirmed that the region of *hsp65* gene amplified by this primer set was present only in mycobacteria. Screening by Mapdaw software (DNA Star) searched out a 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 had 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 sensitivity of the assay was tested by spiking a smear negative sample with serial dilutions of H37Rv. The protocol can detect down to 10 organisms/µl. The specificity of the assay was studied by performing PCR with the new primer set on DNA extracted from *M. tuberculosis* (H37Rv) and MTCC strains of *M. avium*, *M. intracellulare*, *M. terrae*, *M. smegmatis*, *M. gordonae*, *M. kansasii*. We have studied 115 cultures with these primers. Of these, 95 cultures were identified to be *M. tuberculosis*. Five cultures were identified to be nontuberculous mycobacteria (NTM). The PCR amplicons from the DNA extracted from these cultures is being sequenced to confirm that they were NTM.

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

In addition to PRA, we have also used a sybr green assay to identify *M. tuberculosis* using primers to amplify the IS6110 element which is present only in *M. tuberculosis* complex. We have identified 22 clinical isolates of *M. tuberculosis* using the Sybr Green assay. We are in the process of standardising a Taqman assay with a IS6110 Fluorophore-quencher probe and the primers used in the sybr green assay. The assay is being standardised using H37Rv as the positive control and *M. smegmatis* and *M. gordonae* as negative controls in a Lightcycler 480II.

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

Efflux pumps that confer resistance to one or several compounds have been described in mycobacteria. The genome of *M. tuberculosis* strain H37Rv carries 20 such putative efflux proteins, although most of them have not yet been characterised. It is important to characterise and to study the expression profile of such pumps under pressure of different drugs and also to study the mode of action, source of energy used and substrate profile, not only to understand the mechanics of drug resistance but also to design new therapeutic strategies to control the spread of tuberculosis, particularly drug resistant tuberculosis. Recent research into efflux mechanisms in mycobacteria, using standard laboratory strains, has provided promising insights, but the relevance of efflux mechanism to the resistance of clinical isolates of *M. tuberculosis* is only just beginning to become clear.

We propose to investigate the expression analysis of efflux related genes under drug pressure to investigate the role of efflux pumps in drug resistance, particularly in multi-drug resistant isolates of *M. tuberculosis* obtained from patients of pulmonary tuberculosis. We have searched for 10 efflux related genes in *M. tuberculosis in silico e.g.*, Rv2459, Rv3239C, Rv1557, Rv0676C and Rv2339. We are also studying the minimal inhibitory concentration (MIC) of five drug-sensitive and five multi-drug resistant clinical isolates of *M. tuberculosis* by Alamar blue assay. The MIC of the standard laboratory strain H37Rv has been found out to be 0.4µg/ml for streptomycin, 0.04µg/ml for isoniazid, 1µg/ml for ethambutol and 0.015µg/ml for rifampicin. We shall further study the mRNA expression profile of the efflux genes identified bioinformatically, in the drug susceptible and drug resistant clinical isolates of *M. tuberculosis* grown under subinhibitory concentration of antituberculous drugs.

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	2474
Urine	152
Bronchial Aspirate	184
Pleural Fluid	81
Blood	33
Endotracheal Aspirate	89
Pus (FNAC)	10
Total	**3023**

Organisms Isolated	***No.***
Pseudomonas	147
E. coli	20
Klebsiella	54
Enterobacter spp.	13
Acinetobacter spp.	88
GNB	05
Moraxella catarrhalis	05
Haemophilus influenzae	06
Streptococcus pneumoniae	14
Others	17
Total	**369**

ii. Mycobacteriology Laboratory

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

Nature of Specimen	***No.***
Sputum	6710
Bronchial Aspirate	179
Post Bronchoscopy Sputum	148
Pus	05
Broncho Alveolar Lavage (BAL)	53
Chest Drainage Fluid	02
Lymph Node Biopsy	09
Tissue Biopsy	02
Skin Tissue	01
FNAC	25
Pleural Fluid	108
EndoTracheal Aspirate	85
Tracheal Aspirate	12
Blood	07
Urine	07
CSF	02
Total	**7353**

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

Nature of Specimen	***No.***
Sputum	31
Bronchial aspirate	01
Pleural fluid	01
Pus	02
C T guided FNAC	01
Total	**36**
Drug susceptibility	**04**

Pathology

Research

1. Role of nuclear morphometry in diagnosis of sputum cytological atypia

Cytological atypia of exfoliated cells in sputum has been shown to be associated with both prevalent and incident lung cancer; however, its clinical utility remains uncertain till date. One reason for this is the subjective classification of sputum cytology by pathologists into normal (with or without squamous metaplasia), atypia (mild, moderate, severe) and carcinoma with lack of clear criteria between the grades.

A total of 1304 sputum samples submitted to Pathology department, V.P. Chest Institute over a five year period from 2005 to date were reviewed. On the basis of cytology, these cases had been classified into *(i)* Normal, *(ii)* Inadequate/unreadable, *(iii)* Inflammatory expectorate, *(iv)* Inflammatory expectorate with atypia, *(v)* Carcinoma. In cases with atypia, nuclear morphometry was done using the Nikon 90i microscope and image analyser. The nuclear area, nuclear perimeter and nuclear shape of the atypical cells was assessed and compared to mature squamous epithelial cells in the control group.

Of the total 1304 specimen received, 189 cases, 14.49% were within normal limits, 296 cases 22.69% were inadequate/unreadable, inflammatory expectorate was seen in 674 cases, 51.69%. Inflammatory expectorate with atypical cells was present in 127 cases, 9.74% and diagnosis of carcinoma was made in 18 cases, 1.38%. Nuclear morphometry for grading of atypia revealed an increase in nuclear size in moderate atypia when compared to control. Further, increase in atypia was associated with nuclear pyknosis, hyperchromasia and bizarre shape of cells with increase in nuclear cytoplasmic ratio.

Sputum cytology is a simple cost effective noninvasive method of assessment of the central airway lesions. In smokers it can detect cytological atypia which, when accurately graded using nuclear morphometry, may prove to be the much needed marker for lung cancer in this high risk population.

Diagnostic Services

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

A. Haematology

Fully automated Beckman Coulter Haematology analyzer, LH 500 was added to Haematology division in addition to the existing automated five part analyser – Melet Schloesing 9-5. A total of 45611 tests were done during the period as per details given below.

Haematology tests	Number
Haemoglobin estimation	13515
Total leukocyte count	13515
Differential leucocyte count	13515
ESR	2726
Absolute eosinophil count	676
Platelet count	1517
Peripheral smear	79
P/S for malarial parasite	65
Reticulocyte count	03

Coagulation Laboratory

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

Coagulation Test	Number
Prothrombin time	73
Activated partial thromboplastin time	69
D-Dimer	46
Fibrinogen degradation product	40
Bleeding time	316
Clotting time	232

B. Histopathology

A total of 205 biopsies were done during the period as per details given below. Frozen section facility was started. Morphometry and image analysis was started using the Nikon fully motorized microscope.

Biopsies Processed	Number
Lung biopsy	202
Lymph node biopsy	00
Pleural biopsy	03
Skin biopsy	00

C. Cytopathology

A total of 991 samples were done during the period as per details given below.

Cytology Samples Processed	Number
Sputum	520
BAL fluid	68
FNAB : Percutaneous	123
Transbronchial (TBNA)	30
Bronchial aspirate	141
Pleural fluid	109

D. Clinical Pathology

Total of 4995 tests were done during the period as per details given in Table 3

Urine Analysis	Number
Specific gravity	994
pH	994
Albumin	994
Sugar	994
Microscopic examination	994
Ketone bodies	25

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

Pharmacology

Research

1. Possible protective role of Livina (a polyherbal preparation) against anti-tubercular 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, 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. The study was completed in 2008-09. However, the data was analysed and report prepared in 2009-10. On the basis of the data obtained, it was concluded that Livina was *(a)* more efficacious and *(b)* equally safe and tolerable as compared to the placebo. Analysis of both subjective and objective data confirmed this.

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 PFT data was recorded the patients were put on standard anti-asthma treatment with bronchodilators and steroids as inhalation therapy. PFT data was recorded in both groups at 2, 4, 6, 8 and 12 weeks, as also the frequency of use of SOS salbutamol inhalers. Forty-nine patients were initially enrolled out of which there were 9 drop outs – thus, 40 patients have since completed the study. Analysis of the results of 40 subjects indicate that the test drug, UNIM-352, is more effective and better tolerated that the matched placebo. The comparisons were made by *(a)* PFT parameters (FEV_1, FVC and FEV_1/FVC ratio), *(b)* symptomatology score and *(c)* frequency of emergency medication (bronchodilator) usage. In view of the encouraging results, it has been proposed to conduct the study in a larger sample size including some other critical parameters to further corroborate the 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. This is a continuing study in which more patients are being recruited after following the same criteria and methodology/parameters. Initial results indicate that the polyherbal agent, UNIM-352, could act as a good supplement to conventional asthma therapy. It would help in reducing the use of inhaled corticosteroids and short acting beta agonists.

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. Both theophylline and doxofylline produced enhancements in FVC, FEV_1 and FEV_1/FVC ratio in different time intervals in both asthma and COPD patients. The maximum beneficial effect was seen at 6 weeks in asthma and 8 weeks in COPD, with both theophylline and doxofylline. Comparison of effects of theophylline and doxofylline showed that the latter was generally more effective than the former, as measured by subjective and objective criteria, with COPD patients being more responsive to treatment. Assessment of safety parameters indicates that the ADR profile with doxodfylline was lesser than theophylline, in both asthma and COPD. It was concluded that doxofylline was safer and more effective that theophylline in both COPD and asthma, with the differences being more marked in COPD patients.

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. Treatment with oestrogen inhibitors and blockers showed that the stress resistance of female rats was reduced considerably as compared to the vehicle treated groups – bringing them at par with their male counterparts with respect to stress responsiveness. These oestrogen modulators also had significant effects on plasma and brain NOx levels as well as the various behavioural and immune markers of stress. These innovative findings strongly suggest that sex differences exist in stress susceptibility. Male and female rats react differently to emotional stressors like restraint stress, and NO may be having a regulatory influence in such sex-dependent nature of stress reactions. Further studies are on in this area to elicit the signal transduction mechanisms involved in these differential effects.

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

Endogenous opioids are important neuromodulators 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. Other selective opioid agonists and antagonists for k and delta receptos also showed differential nature of effects on stress parameters studied.

The mu opioid antagonist, naltrexone, showed opposite effects, and the k-antagonist, norbinaltorphimine, showed mixed responses. No such clearcut responses were seen with the delta antagonist, naltrindole. Neurobehavioural data after acute and repeated RS exposure showed a good correlation with brain biochemical data (NOx) with reference to morphine. Pretreatment with the NO depletor, L-NAME, attenuated morphine effects during RS. Further, sub threshold doses of morphine and NO mimetics synergised with each other in protecting against stress effects. Morphine induced attenuation of neurobehavioural effects were accompanied by elevations in brain NOx. These results suggest that opioids like morphine may act through NO during stress ameliorating effects. In addition, it appears that the mu receptor is probably most active in the stress relieving effects of opioids, and kappa and delta receptors are possible facilitatory in nature, indicating cross talk between these three opioid receptors during stress. Studies are being extended to elicit the cellular and molecular mechanisms of action of these agents.

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

Herbal drugs are strongly emerging as effective and complimentary/alternative forms of therapy in several complex disease states, and evidence based medicine with phytopharmaceuticals are increasingly on the rise. 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. The effects of UNIM-352 at two dose levels, *viz.*, 200 and 400 mg/kg orally, were tested on markers of inflammation and immunity, pertinent to bronchial asthma, in KLH immunised, normal as well as stressed rats. Restraint stress (RS) was used as the model for emotional stress. The polyherbal agent, dose dependently attenuated levels of the pro-inflammatory cytokines, TNF-α and IL-1β, in both normal as well as stressed rats. The levels of reduction in these two cytokines were apparent in both blood and BAL fluid. On comparison with the standard anti-inflammatory agent, prednisolone, the effects of UNIM-352 were most comparable, with the results with the higher dose (400 mg/kg) being most notable. Levels of the Th2 dependent cytokine, IL-4 were also affected markedly by the polyherbal formulation. The effects with the higher dose being most marked and also most comparable with the positive control group, *i.e.*, prednisolone. Most of these results achieved levels of statistical significance ($p<0.05$). Assay of the antioxidant profile showed that, UNIM-352, dose dependently, elevated the GSH levels in both blood and BAL fluids. On the other hand, levels of MDA, an index of lipid peroxidation and free radical generation, were lowered in both normal and stressed rats in the blood. Nitric oxide metabolites (NOx), which were also influenced during exposure to the antigen as well as stress, were also modulated by the UNIM=352 treatment, but most of these data were either inconsistent or not statistically significant. Interestingly, the DTH response, as measured by the change in footpad thickness in immunised and subsequently KLH (paw) challenged rats, there was not any marked changes after UNIM-352 treatment. Thus, analysis of the cytokines showed that expression of TNF-α, IL-1β and IL-4 - all showed that UNIM-352 was equally effective in lowering this proinflammatory and immunomodulatory cytokine levels in both blood and BAL fluid samples. There was a significant decreasing effect in MDA levels in prednisolone and UNIM-352 treated groups as compared to the controls, whereas, lowered GSH levels were reverted back to normalcy under the influence of UNIM-352. Regarding the change in the levels of nitric oxide metabolites in both blood and BAL, UNIM-352, showed inconsistent changes in the NOx levels in normal and stressed groups. Though no clearcut picture emerged from the CMI experiment, a marginally higher DTH was observed in the prednisolone and UNIM-352 treated groups, as compared to vehicle controls. The present results provide new dimensions for the use of UNIM-352 allergic and inflammatory conditions, and validate the use of this polyherbal in bronchial asthma. The data needs to be supplemented with experiments involving bronchial hyperreactivity, and initial isolated tissue preparations with guinea pig tracheal chain set up has

shown encouraging results. Further, the involvement of nitric oxide (NO) and its interactions with oxidative stress markers needs to be investigated in detail to further corroborate the proposed UNIM-352 therapeutic effects. This reverse pharmacology approach will go a long way to bridge the gap between traditional and modern medical concepts in the treatment of disease states. Studies are planned and are being executed to explore this.

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

There is growing concern about increasing antibiotic use and the consequent emergence of antibiotic-resistant microorganisms. Enhanced antimicrobial surveillance is one of the strategies to control antimicrobial overuse or misuse in the community. Information on the trends, patterns and behaviour of antibiotic consumption is essential for intervention programmes for rational use of antibiotics. In a number of developed countries, extensive surveillance programmes have been developed to study patterns of antimicrobial resistance and antibiotic use. However, the problem of antimicrobial resistance has received relatively little recognition in developing countries and the ability to undertake extensive surveillance is lacking in resource-constrained countries. WHO collaborated and funded pilot project (2004) for developing validated reproducible and sustainable surveillance methodology to quantify antimicrobial resistance and antibiotic use in the community. The pilot project conducted in West Delhi, utilised a methodology that monitored antimicrobial use in the community through patient exit interviews at private retail pharmacies (Kotwani *et al*., IJMR 2009). The second phase of surveillance (2007-2008) expanded the established methodology, in collaboration with WHO, with the following objectives:

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.

Data collection was finished by November 2008; detailed analysis was done during 2009. In brief, the results showed 39% of the patients who visited during data collection period had encountered with at least one antibiotic in public sector and at private retail pharmacies whereas 43% of patients visiting private clinics were prescribed antibiotics. Consumption and use of various classes of antibiotics at private retail pharmacies and private clinics was similar. Trends and patterns of various antibiotic groups were analysed each month for one year. Newer members from each class of antibiotics were used more than the older members. Consumption of cephalosporins had increased and use of macrolides had decreased since 2004 in the private sector.

Antibiotic consumption was very high in the community. All classes of antibiotics were used in the public sector whereas in private sector mainly fluoroquinolones, cephalosporins and extended-spectrum penicillins were used. Methodology for surveillance of antimicrobial in the community was validated and this methodology can be used in any resource-constrained settings. On the basis of findings from the survey interventions can be planned to decrease the use of antibiotics in the community that will ultimately lead to decrease in antimicrobial resistance.

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

Objectives of the study

a. Investigate the reasons for irrational use of antibiotics with stakeholders through focus group discussions and in-depth interviews.

b. In-depth group discussions for planning suitable and sustainable interventions with all stakeholders.

Number of FGDs conducted:

In-depth interviews and FGDs conducted:

Doctors - public and private sector	3
Pharmacists - public and private	3
Community – RWA office bearers & members	3
NGOs, MLA, Councillors	
Schools – Public and private	6

The FGDs were videotaped, transcribed ad verbatim and translated in English and then back translated to Hindi to assure consistency of the language. The FGDs text was analysed using grounded theory by open coding for arriving at the themes independently. Qualitative analysis was done in collaboration with anthropologists (medical anthropologists).

Findings clearly indicated that awareness regarding antibiotic resistance and use amongst all stakeholders is poor. All the stakeholders were ready to take part in interventions and eager to increase their knowledge and awareness about antibiotic misuse and resistance.

9. Use of antibiotics in acute respiratory infections (ARI) and diarrhea in the community

Irrational use of antibiotic is very common in acute respiratory infections 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.

At public facilities 45.3% and at private facilities 56.7% of patients with ARI were prescribed at least one antibiotic. For diarrhea, at public facilities 43% and at private facilities 69% of patients were prescribed at least one antibiotic. Details regarding which particular antibiotic were prescribed in public and private sector was also analysed. Over-prescription and irrational use of antibiotics was seen in ARI and diarrhoea.

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

Pulmonary hypertension (PH) is a haemodynamic state shared by a variety of disorders with diverse aetiology 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 oedema. This is an important problem for the lowlanders deployed to high altitude stations. A major cGMP-degrading phosphodiesterase in the pulmonary vasculature is up regulated in PH. Phosphodiesterase 5 (PDE5) inhibitors are promising therapeutic agents for the treatment of PH. Tadalafil, a newer 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, the effect of tadalafil in acute pulmonary vasoconstriction and chronic pulmonary hypertension was studied.

Objectives of the study

a. To investigate the *in vivo* effect of tadalafil on hypoxia induced acute pulmonary vasoconstriction and chronic pulmonary hypertension in rats.

b. To study the *in vivo* effect of tempol on hypoxia induced acute pulmonary vasoconstriction and chronic pulmonary hypertension in rats.

c. To determine the role of tadalafil and tempol on lung inflammation in hypoxia induced pulmonary hypertensive rats.

d. To probe whether tadalafil acts *via* antioxidant mechanism in addition to its phosphodiesterase-5 inhibitory activity for inhibiting lung inflammation in hypoxic pulmonary hypertensive rats.

For induction of acute pulmonary vasoconstriction in rats, lungs were mechanically ventilated with a hypoxic mixture of oxygen (10%O_2) for 30 minutes. 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.

Results of the present study suggest that long acting PDE5 inhibitor, tadalafil has significant hypoxia protection activity and is able to increase the hypoxic tolerance. Tempol also showed beneficial effects against both acute hypoxic pulmonary vasoconstriction and chronic hypobaric hypoxia induced pulmonary hypertension. However, tempol led to fall in systemic blood pressure in acute model and did not produce any improvement in fall in right ventricular contractility and cardiac output induced by chronic hypobaric hypoxia. In contrast, treatment with tadalafil showed favourable effect on haemodynamics in both acute and chronic models. Tadalafil demonstrated antioxidant and anti-inflammatory action in addition to its phosphodiesterase 5 inhibitory activities. All these three actions combined may have a positive impact of tadalafil in treatment of pulmonary hypertension.

11. Regulation of pulmonary vascular tone during hypoxia induced pulmonary vasoconstriction

Hypoxia induced pulmonary hypertension results in an increase in pulmonary vascular resistance, pulmonary hypertension and right heart dysfunction. We investigated the acute responses of the pulmonary vasculature to hypoxia and tried to find the regulatory and counter-regulatory aspects of hypoxic pulmonary vasoconstriction. In particular, the roles of nitric oxide, phosphodiesterase 5, endothelin receptor activation, ATP sensitive potassium channel inhibition and reactive oxygen species generation were delineated. Effect of tadalafil, superoxide dismutase (SOD), BQ-123, glibenclamide, L-NMMA on right ventricular systolic pressure was investigated by exposing rats to acute hypoxia of 30 minutes. Effect of hyperoxia (exposing rats to 100% O_2 for 30 minutes) on right ventricular systolic pressure (RVSP) was also studied. For chronic hypoxia rats were exposed to hypobaric hypoxia of 30 min daily for one week and effect of l-arginine and vitamin E was studied on endothelin functions in pulmonary arteries.

The results of the study indicate that phosphodiesterase 5, oxidative stress, endothelin, NO, and K_{ATP} channel pathways are involved in pathophysiology of hypoxia induced pulmonary hypertension. Treatment with tadalafil, SOD, BQ-123 may be beneficial in treatment of pulmonary hypertension. Chronic hypobaric hypoxia is associated with endothelium dysfunction. Treatment with l-arginine and vitamin E may be beneficial in hypoxia induced endothelium dysfunction because they restore normal vascular tone.

12. Lipid reducing herbal compounds provide protection against diabetes induced cardiovascular disorders

Diabetes mellitus, a metabolic disorder, is characterised by hyperglycemia, altered metabolism of lipids, carbohydrates and proteins. Cardiovascular complications are one of the most common causes of morbidity and mortality in diabetic patients. It was hypothesised that lipid reducing herbal compound Arjuna may provide protection against diabetes induced cardiovascular disorders. Therefore, we investigated the effect of statin (synthetic agent) and Arjuna as cardio protective agents in diabetes induced cardiovascular disorders in animal model. Streptozotocin-induced rat diabetic model was used.

It was found that Arjuna bark extract treatment significantly restored altered haemodynamic functions, ventricular (LV) functions like LV end diastolic pressure, LVdP/dtmax, LVdP/dTmax/P and baroreflex sensitivity of diabetic animals. Arjuna and statin per se did not produce any significant effect in normal rats. In diabetic rat aorta rings relaxation produced by ACh was significantly less than control rats. Decrease in response to ACh may be due to endothelium dysfunction following diabetes. On treatment with Arjuna and statin there was increase in endothelium dependent vasorelaxation produced by ACh. Results indicate that treatment of diabetic rats with Arjuna is beneficial in restoring impaired haemodynamics and LV alterations and it also improved endothelial dysfunction induced by diabetes. Thus, herbal compound Arjuna bark extract provide protection against diabetes induced cardiovascular dysfunctions.

13. 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 been studied by many investigators in the developed countries, but present knowledge about reason for adherence to inhaled essential medicines for asthma 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 was conducted in adult asthma patients visiting emergency room (ER) for an acute asthma exacerbation at Vishwanathan Chest Hospital of our Institute.

Objectives of the study were to explore the various factors associated with poor asthma control and non-adherence to asthma treatment among adults with asthma visiting Emergency Room (ER) with acute exacerbation, describe trends in poor asthma control in the past one year and assess patients' self reported adherence/non-adherence to asthma controller therapy.

This cross-sectional self-report study of 200 patients with confirmed asthma visiting the ER gives a detailed picture of the various factors associated with non-adherence to asthma treatment amongst these patients. The important factors being that many patients presenting to ER did not have basic knowledge of asthma disease and its management, irrespective of their socio-economic and clinical status. Most of the patients considered asthma as an acute condition which does not require treatment during asymptomatic period. This no symptoms, no asthma belief appears to affects patients' entire perspective about asthma. Very few patients believed in chronic nature of asthma. Apart from acute episodic belief for asthma, cost of therapy was one of the important reasons for non-adherence to therapy.

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

The study was designed to investigate the convulsiogenic and proconvulsant role of theophylline in electrically, chemically and kindling induced seizures and associated neurobehavioural paradigms. Specifically, we investigated the possible role of nitric oxide (NO) and its interactions with oxidative stress markers during theophylline effects. 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 anxiety and convulsions and to correlate with the anti-oxidant/pro-oxidant status in the brain. Modulation of these effects with anti-oxidants was a key finding 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 behavior was seen with the NO synthase inhibitor, L-NAME and 7-nitroindazole. Melatonin synergised 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. Lower doses of theophylline induced anxiogenic behaviour alone and in combination with emotional stressors like restraint stress (RS) in the elevated plus maze test. Such anxiogenic behaviour was attenuated by NO precursor, L-arginine and

aggravated by L-NAME. Brain homogenates of such anxiogenic rats showed lower levels of NOx as compared to normal and anxiolysis situations. Biochemical markers supported these behavioural effects. These studies showed a differential role of NO and its complex interaction with oxidative stress markers during theophylline induced neurobehavioural effects.

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

The study evaluated the impact of acute and repeated 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. Exposure to acute RS induced behavioural suppression (in elevated plus maze), elevated plasma corticosterone levels (HPLC), and induced immune suppression (adaptive immune markers), and NO modulators (mimetics and synthesis inhibitors) differentially influenced these changes. Further, cold restraint stress (CRS) induced gastric lesions were attenuated by NO mimetics and aggravated by NO depletors, in a consistent manner. These studies indicated a positive regulatory role for NO in stress susceptibility. Further pharmacological and biochemical data also showed that NO may also be involved in the cellular/molecular events resulting in stress tolerance. Repeated stress (RS) exposure attenuated acute stress responses and these were associated with parallel changes (relative elevations) in plasma and brain NO metabolite (NOx) levels. Pretreatment with NO modulators influenced these stress markers and also modulated the biochemical parameters studied. Additional studies with conventional anti-anxiety/anti-stress agents (diazepam and morphine) 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 (6h) x10, 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, 1h x10), whereas. In the severe RS group (RS, 6h x10) 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.

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

The objective of the study is to evaluate the signal transduction mechanism involved in stress-induced immunomodulation with special reference to NO-ergic pathways. Pilot studies have shown that mechanism other than the conventional GC-cGMP pathways may be involved in such stress-immune interactions and that the CNS may play a crucial regulatory role.

Physiology

Research

1. Continuation of the 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 and provided with food and water ad libitum were used as experimental animals. The experiments were performed on two groups of animals – *Group I* (Control), and *Group II* (Acute exposure to high altitude – height, 15,000 feet and duration of exposure, 12 hrs). Group I breathed room air. Group II were exposed to the desired height and duration in a high altitude simulation chamber. RAR activity was recorded in both the groups.

Group I (Control, n=6)

Effect of calcitonin gene related peptide (CGRP) on baseline RAR activity

CGRP (doses: 0.1, 0.2 and 0.4 µg/kg) produced a dose-dependent increase in RAR activity. However, the increase in RAR activity was significant only with the highest dose tested ($p<0.05$). Following the administration of the CGRP agonist, Captopril, there was gradual increase in the baseline RAR activity. On repeating the doses of CGRP, it was observed that there was an increase in the responsiveness of RARs to CGRP. The receptor activity increased significantly not only with the dose of 0.4 µg/kg, but also with the (sub-threshold) dose of 0.2 µg/kg ($p<0.05$).

Group II (Acute exposure to high altitude, n=6)

In this group of animals, there was a significant increase in the basal activity of the RARs. CGRP (doses: 0.1, 0.2 and 0.4 µg/kg) produced a dose dependent increase in RAR activity. The RAR activity increased significantly with all the doses tested ($p<0.05$, $p<0.01$ and $p<0.001$ respectively). Following the administration of the CGRP agonist, Captopril, there was an increase in the basal RAR activity. On repeating the doses of CGRP, it was observed that there was a larger increase in RAR activity for the same doses of CGRP.

These findings indicate that after exposure to high altitude, there is a significant increase in the basal activity of RARs. It is proposed that this increase is due to pulmonary congestion associated with high altitude exposure. Additionally, in this background, there is sensitisation of RARs to vasodilator peptides such as CGRP.

2. Responsiveness of airway rapidly adapting receptors (RARs) to reactive oxygen species generated *in vivo*

The experiments were conducted on anesthetised and artificially ventilated rabbits (n=6).

In vivo Generation of Reactive Oxygen Species (ROS)

Generation of ROS

To generate the ROS *in vivo*, xanthine and xanthine-oxidase (X-XO) were inhaled. X-XO was dissolved in phosphate buffered saline to a volume of 3 ml. Then successive inhalations of X (0.1%) for 1 min and XO (1 U/ml) for 1 min were given to the anesthetised animals using the ultrasonic nebulizer.

In this protocol, the RAR activity was recorded continuously. The first 5 breaths served as the RAR activity during the control period. The next 24 (6^{th} to 29^{th}) breaths served as the RAR activity during the X inhalation. The succeeding 20 breaths (30^{th} to 49^{th}) served as the RAR activity in the experimental period. X inhalation was given from the 6^{th} breath onwards for a period of 1 min (24 breaths).

After another 5 min, again The RAR activity was recorded for another 49 breaths as before. Here instead of X, XO inhalation was given from the 6^{th} breath onwards for a period of 1 min (24 breaths).

Responses of RARs

The mean RAR activity recorded in the animals of this group during the control period was 7.1±1.04 impulses/breath, which increased significantly during the X inhalation to 11.13±1.29 impulses/breath ($p<0.001$). In the experimental period, even though there was a significant decrease in activity ($p<0.05$), the RAR activity remained elevated from the control and it was10.23±1.23 impulses/breath ($p<0.001$, compared to the control).

The mean RAR activity recorded in the control period before XO inhalation was 9.53±1.04 impulses/breath, which increased significantly during the XO inhalation to 17.30±1.77 impulses/breath ($p<0.01$). In the experimental period, the RAR activity was recorded as 17.92±1.60 impulses/breath ($p< 0.01$, compared to the control).

The mean tracheal pressure during X inhalation increased from the basal value of 5.60±0.35 to 6.11±0.30 cmH_2O ($p<0.01$), which occurred with a latency of 36.44±1.13 sec. The tracheal pressure kept on increasing even in the experimental period to 6.60±0.25 cmH_2O ($p<0.01$). The peak increase in tracheal pressure was 6.86±0.21 cmH_2O, which occurred with latency of 62.52±2.04 sec.

On inhalation of XO, the tracheal pressure increased from 6.31±0.28 to 7.42±0.28 cmH_2O ($p<0.01$) with a latency of 25.33±3.11 sec and it increased to 8.30±0.40 cmH_2O in the experimental period ($p<0.01$). The peak increase in tracheal pressure was 8.70±0.46, which occurred with a latency of 68.25±6.8 sec.

These results indicate that *in vivo* generation of ROS stimulates the RARs. This stimulation is independent of changes in airway pressure. Airway inflammation produced by ROS may be an underlying mechanism for the activation of RARs.

3. Behaviour of pulmonary vagal sensory receptors with myelinated afferents during free radicals induced airway hyper-reactivity and its modulation by anti-oxidants in guinea pigs

Aims of the study

a. To develop a guinea pig model of asthma.
b. To examine the behaviour of rapidly adapting receptors (RARs) and slowly adapting receptors (SARs) in this model.
c. To explore the roles of oxidative stress in the airway hyperresponsiveness (AHR) and the responses of these receptors in this model.

This is an ongoing work in the department.

Basal RAR/SAR activity and oxidant-antioxidant status

Only the solvents/placebo was injected in this group. The animals were anesthetised and basal airway mechanics was measured. Afferent activity from either RAR or SAR was recorded. Then histamine inhalation was given starting with 0.02 mg/ml and doubling concentration until the airway resistance increases by 50%. The maximum concentration of histamine administered did not exceed 5 mg/ml at any given time. The changes in afferent activity were recorded. Along with the afferent activity, airway mechanics was recorded throughout this protocol.

Till date, the afferent activity has been recorded from 3 SARs and 1 RAR only.

Pulmonary Mechanics

Airway resistance

In the control as well as animals sensitised and challenged with ovalbumin, there was a dose dependent increase in airway resistance when successive doses of histamine were given. The basal airway resistance in ovalbumin challenged group was higher as compared to control group, but that was not statistically significant. However, in the control group, the 50% rise in airway resistance occurred at a much higher dose of histamine (0.4160±0.096 mg/ml) as compared to that in the ovalbumin challenged group (0.088±0.019 mg/ml) and the difference was statistically significant ($p<0.05$). At the point when there was 50% rise in airway resistance, the mean value of airway resistance in control group was 0.0697 ±0.005 $cmH_2O/ml/s$, and that in ovalbumin challenged group was 0.0974 ±0.019 $cmH_2O/ml/s$.

Tracheal pressure

In the ovalbumin challenged group, there was an increase in the basal tracheal pressure. In both the groups, there was a dose dependent increase in tracheal pressure when successive doses of histamine were given.

The percentage increases in tracheal pressure in the ovalbumin challenged group were higher when compared with those in the control group. For any given dose, there was a larger response in the ovalbumin challenged group.

Oxidative Stress

a. Lipid peroxidation

The extent of lipid peroxidation in ovalbumin challenged group (9.022±1.0 nM TBARS/ml) was significantly higher as compared to that in control group (4.295±0.24 nM TBARS/ml) ($p<0.01$).

b. Catalase

The catalase activity was found to be significantly reduced in the ovalbumin challenged group (2.001±0.47 Units/g Hb) as compared to control (4.636±0.40 Units/g Hb) ($p<0.05$).

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 2462 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	1340
Head CT	21
PNS CT	966
Abdomen CT	07
CT guided FNAC	128
Total	**2462**

(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	299
Abdomen USG	173
USG guided FNAC	97
Total	**569**

(iii) X-Ray Unit

A total of 20834 X-ray examinations were done during the period as per the details given in Table 3. Out of a total of 20834 X-ray examinations made 12809 were done on digital system and 8025 were done on X-ray films.

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

Examination	Number
Total X-rays	**20834**
Digital X-Ray	
Chest X-ray (adult)	10335
Chest X-ray (child)	934
PNS X-ray	1540
Total Digital X-ray	**12809**
FILM X-Ray	
Chest X-ray (adult)	7762
Chest X-ray (child)	263
Total Film X-ray	**8025**

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

"35th Workshop on Respiratory Allergy: Diagnosis and Management" held on 8th-12th March 2010. *Dignitaries on the dais (left to right)*: Dr A.B. Singh, Emeritus Scientist; IGIB, Delhi; Dr V.K. Vijayan (Director, VPCI); Mr Javid A Chowdhury, former Secretary, Ministry of Health and Family Welfare, Government of India; Dr Rajesh S. Gokhlae, Director, IGIB., Delhi, Prof. Raj Kumar, Organising Secretary of the Workshop.

Faculty and participating delegates of "35th Workshop on Respiratory Allergy: Diagnosis & Management" held on 8th-12th March 2010.

Respiratory Allergy and Applied Immunology

Research

1. Obesity and asthma

There are various important interactions between obesity and asthma. It is hypothesised that obesity increase airway inflammation, but there is no significant difference for the inflammatory markers in between the groups. The morbidity and mortality from asthma are increased in individuals with obesity, as there is difference in the lung volumes between the groups mainly in functional residual capacity (FRC) and expiratory reserve volume (ERV). The study consists of sixty subjects divided into two groups, group 1with normal BMI and group 2 with BMI >30. Haemoglobin, total leukocyte count, differential count, blood sugar, serum triglycerides, total cholesterol, VLDL, LDL were done in each patient. Complete pulmonary function test including diffusion was conducted in both the groups. Inflammatory marker FeNO and hs-CRP was conducted in obese and non-obese asthmatics. In our study of Indian population, there are no significant difference between obese and non-obese asthmatics for inflammatory markers like FeNO and hs-CRP, skin testing to common aeroallergens and food allergens as consistent with the western data. The parameters like FRC and ERV are significantly lower in the obese group. The parameters in significance between the groups are blood sugar values and lipid profile, being more in the obese group. The study which shows that cholesterol values increased in the obese group; with cholesterol treatment, any improvement in the disease state in obese patients needs further study. Obesity and asthma shown to coexist, systemic and airway inflammation appear to operate independently. This might explain the need for increased inhaled anti-inflammatory therapy in obese patients with asthma and the difficulties encountered in achieving good asthma control in such patients.

2. Impact of indoor respirable particulate matter on respiratory allergy in children in India – an exposure response studies

Indoor respirable particulate matter (PM_5) poses a significant risk to human health because it can be breathed deeper into the lungs and is more toxic than larger particulate matter. Present study was conducted at the industrial, residential and urban village locations of Delhi, India to identify the impact of indoor respirable PM_5 on respiratory allergy in children (7-15 years). PM_5 is respirable particulate matter with an aerodynamic diameter of equal to or less than 5 μm in size. Demographic profiles and respiratory symptoms of children were collected through a questionnaire. Pulmonary function test of children was performed using spirometer and PEFR was measured with peak flow meter. Indoor PM_5 was determined using cyclone attached handy air sampler (Low volume sampler). A total of 3456 children were examined, 59.2% male and 40.8% female. 34.8% children were exposed to environmental tobacco smoke. 31.2 % children's families used biomass fuels (coal, wood, kerosene and cow dung cakes) for cooking and 68.8% used liquefied petroleum gas. Diagnosis of asthma, rhinitis and upper respiratory tract infection (URTI) was done in 7.7%, 26.1% and 22.1% children, respectively. The mean level indoor PM_5 was 191.67±104.5 μg/m^3 in Delhi, higher in industrial areas (245.50±95.48 μg/m^3) followed by residential (207.17±90.90 μg/m^3) and urban villages (102.84±66.69 μg/m^3). The mean level of indoor PM_5 was statistically significantly higher in houses where children had asthma (p=0.001), rhinitis (p=0.001) and URTI (p=0.001). High concentration of indoor PM_5 was significantly (p=0.006) associated with environmental tobacco smoke in industrial areas. The mean level of indoor PM_5 was also significantly (p=0.001) higher in the houses where families used biomass fuels than in households using liquefied petroleum gas for cooking. Present study concluded that higher concentration levels of respirable particulate matter (PM_5) may cause respiratory allergy among children.

3. Compositional study of domestic airborne particulate matter in industrial locations of Delhi and its relationship with asthma in children

Particulate matter (PM) is an environmental concern of many cities throughout the world and affects human health. High exposure to particulate matter can trigger asthma attacks. The present study was undertaken at Shahdara and Shahzada Bagh industrial areas of Delhi with the primary objective to determine the mineralogy and chemical composition of indoor suspended particulate matter (SPM) and its association with asthma in children (7-15 years). The presence of minerals in indoor SPM was identified by X-ray diffraction

analysis and the toxic elements were determined by atomic absorption spectrometer (AAS). The diagnosis of asthma was made if the children were having at least three of the following symptoms for over 2 years – history of cough, phlegm production, shortness of breath, wheezing and medical examination with pulmonary function test. A total of 831children (59.7% male and 40.3% female) were studied. 33.8% children were exposed by environmental tobacco smoke (ETS). 70.3% children's family was using LP Gas for cooking where 29.7% using biomass fuels (kerosene, wood, coal and cow dung cakes) for cooking. 11.8% children were diagnosed to have asthma of which 14.2% were in Shahdara and 9.6% in Shahzada Bagh. The mean indoor SPM level was 1080±482 $\mu g/m^3$. The mean level of indoor SPM was high in the houses of Shahdara and Shahzada Bagh industrial areas of Delhi where children diagnosed to have asthma. Mineral groups such as quartz, carbonates (calcite and dolomite), mica (illite and muscovite), feldspar, talc-chlorite (talc and chlorite) were identified in the indoor SPM. High amount of quartz and mica minerals were associated with asthma in children. Major elements including Si, Al, Fe, Mg, Ca, Na, K, Mn and trace elements such as Cr, Co, Ni, Pb, Cu, Zn, Mo, Cd were also determined in the indoor SPM. The mean concentration level of Si, Cr, Ni, Pb, Zn and Cu was statistically significantly high in the houses where children having asthma. Cobalt and lead was statistically significantly high in the houses where environmental tobacco smoke exposure was present. Present study revealed that high concentration level of particulate matter containing quartz, carbonate, mica, and several major and trace elements including Si, Cr, Ni, Pb, Zi and Cu are an important factor causing increased asthma among children.

4. Evaluation of oxidant-antioxidant status in different stages of COPD: determination of serum paraoxonase1 and malonyldialdehyde levels

Oxidant-antioxidant imbalance is considered to be one of the causative factors of COPD. Paraoxonase1 (PON1) is an antioxidant enzyme and malonyldialdehyde (MDA) reflects oxidative processes. To evaluate the levels of PON1 and MDA and their correlation in mild, moderate, severe and very severe stages of COPD and in healthy smoking and non smoking subjects.

PON1 and MDA were evaluated in 60 patients of COPD (15 each of mild, moderate, severe and very severe stages),15 healthy smoking and 15 non smoking subjects. Mean Levels of PON1 was significantly lower in COPD patients as compared to controls. Levels decreased with increasing severity of COPD {mild (146.18±61.20 KU/L), moderate (90.30±29.99 KU/L), severe (84.45±34.89 KU/L), very severe (43.19±35.76 KU/L)}. Levels were lower in healthy smokers (143.26±55.54 KU/L) as compared to non smokers (192.55±54.71 KU/L). Difference of means was significant on ANOVA.

Mean levels of MDA were significantly higher in COPD patients as compared to controls. MDA levels progressively rose with increasing severity of the disease {mild (7.73±3.82 nmol/ml), moderate (10.90±4.75 nmol/ml), severe (11.32±4.88 nmol/ml), very severe (12.19±5.76 nmol/ml)}. Levels were higher in healthy smokers (5.95±3.79 nmol/ml) than non smokers (3.57±1.79 nmol/ml). Difference of means was significant on ANOVA. Significant negative correlation was obtained between PON1 and MDA (r -0.309, $p<0.01$).

Levels of PON1 are significantly decreased and MDA significantly increased in COPD and the change is proportionate to disease severity. Negative correlation is seen between PON1 and MDA.

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. Concomitant occurrence of allergic bronchopulmonary aspergillosis (ABPA) and allergic *Aspergillus* sinusitis (AAS): is it an uncommon association?

Ever since our first report on concomitant ABPA and AAS in 1990, we have diagnosed and subsequently reported several other such cases. With increasing awareness of the two conditions and the possibility of their co-existence, this association is being reported increasingly from the world over. We felt the need to analyse existing data, which mostly is in the form of case reports/series, anticipating that a closer look could indicate a much stronger association between the two conditions than is currently believed to be. Twenty-two cases of conclusively proven concomitant ABPA and AAS were found to have been described till date, and half of these have been reported in the last three years. Of these, three were cases of familial ABPA recently reported by us. Of the 22 cases, nine were female, and the age of the patients ranged from 17 to 58 years. Several of them had chronic symptoms for many years before a diagnosis of allergic aspergillosis was established. Nasal symptoms preceded chest symptoms in six patients and *vice-versa* in three. In seven patients nasal and chest symptoms appeared concurrently. Nasal discharge was the predominant symptom reported (16/22), followed by dyspnoea/wheezing (14/22), cough (13/22) with sputum (12/22), and nasal blockage (12/22). Plugs/casts in sputum were confirmed in five patients, with four others denying their presence. Nasal plugs were reported in nine and absent in four patients. Sinus surgery was performed on six patients, one of which required ocular decompression and also excision of frontal lobe brain abscess. All patients received oral corticosteroids. Six received antifungals one of them was recently reported to have responded favourably to voriconazole. All but two patients responded favourably, initially and during follow-up, to the respective therapies received by them. The term "sinobronchial allergic mycosis" (the SAM syndrome) was coined to highlight the expression of fungal hypersensitivity in both upper and lower airways. With the increase in reports of concomitant ABPA and AAS the disease is certainly not uncommon, as it has so far believed to be. Better awareness of this association could further increase its diagnosis and thus prove to be beneficial in management and improving outcome of those suffering from this chronic disease. We conclude that all patients with ABPA should be investigated for AAS and *vice-versa*.

Respiratory Virology

Research

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

Center for Disease Control and Prevention (CDC), Atlanta USA and Indian Council for Medical Research (ICMR), have set up nine multi-site surveillance centers across the country to monitor the antigenic and genetic changes occurring in influenza virus strains circulating in India. VPCI is one of the regional centers working in collaboration with the referral centre National Institute of Virology (NIV), Pune.The major research objective is to detect new and potentially dangerous strains of influenza virus rapidly so that measures may be enacted in the event of outbreak situation. Antigenic variation occurs primarily in the haemagglutinin (HA) and neuraminidase (NA) glycoproteins and results in recurrent epidemics of influenza, thus making it necessary to continuously study the recent variants, that would be helpful in formulating vaccine.

One thousand-three-hundred-eighty (1380) specimens were collected by our laboratory between the periods 15th September 2006 to 31st March 2010 from OPD/IPD of different hospitals in Delhi region *viz.*, Kalawati Saran Children Hospital, Lok Nayak Jai Prakash Hospital, Chacha Nehru Bal Chikitsalaya and Vishwanathan Chest Hospital (VPCI). All the clinical specimens were inoculated in Madin-Darby canine kidney (MDCK) cell lines immediately after processing of the specimens. Of the1380 clinical specimens collected as routine diagnostic work, one hundred- seven (107) specimens were found positive (7.75%) by PCR and HA test in which 4 were seasonal H1N1 (0.28%), 29 were H3N2 (2.1%), 14 were Flu B (1.01%), 40 (2.9) were pandemic H1N1 and 20 viruses (1.45%) were Influenza A (seasonal). Influenza virus isolated after inoculation in MDCK cells and chicken embryonated eggs were typed and sub-typed by haemagglutination Inhibition (HAI) techniques and conventional PCR.

Maximum numbers of influenza virus were isolated in patients in the age group of 0-5 years as compared to the age group 6-15 years. Male patients were found to be more susceptible to infection than females in the ratio of 1.44:1 (815 M & 565 F). The two peaks of influenza virus positivity were observed in between November to February and between July and August. A correlation of influenza virus activity with the meteorological data of Delhi showed that 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 and recently during the pandemic phase (2009), the pandemic H1N1 has dominated over the seasonal strains of the virus.

2. Diagnosis of the novel pandemic 2009 H1N1 influenza virus in suspected swine flu cases

The recent outbreak of pandemic H1N1 influenza has been an acute threat to mankind affecting more than 213 countries and overseas territories within a very short span of time. Reports of more than 14, 83,520 confirmed cases and more than 16,226 registered deaths word-wide till March 2010 proves that the virus is circulating globally.

Soon after the emergence (April 2009) in Mexico and USA, the virus rapidly spread across the nations putting the health authorities of all affected countries in trouble. Keeping in view of the prevailing pandemic situation around the world, three government institutes in Delhi region were authorised by Government of India to test the pandemic influenza H1N1 virus VPCI is one of the centres for pandemic influenza 2009. The virology department remained open for 7 days to provide the results within 24 hours to cope up with the emergency relief of the critical ILI patients admitted at different hospitals of Delhi.

In this outbreak situation, a real-time RT-PCR assay was immediately standardised and evaluated in our laboratory, as per the CDC guidelines, for the detection of the recent pandemic H1N1 2009 strain which circulated around the world causing colossal loss of human life. The assay was performed to detect the HA gene for the identification of pandemic influenza virus. The primers and probes which were provided by NIV, Pune, were tested against a panel of known negative controls, positive controls and also for control RNA isolated from the HeLa cell line. The assay offered rapid identification of the pandemic swine H1N1 at even very low viral loads that are negative by the conventional RT- PCR and was found to be most useful molecular

assessment tool against the pandemic influenza H1N1 virus. We reported first 2 cases for pandemic influenza H1N1 2009 from the Vishwanathan Chest Hospital, VPCI on 13th August 2009. Apart from our routine specimen collection from various hospitals suspected swine flu cases were also sent regularly by National Centre for Disease Control (NCDC) for pandemic H1N1 testing at our laboratory. A total of 468 samples were tested for pandemic H1N1 with the real-time RT-PCR out of which 239 samples tested positive (51.06%) for the influenza A virus. Of total positive cases, pandemic H1N1 virus was 164 (35.49 %) and Influenza A virus was 75 (16.23 %).

3. Detection of influenza virus induced ultrasructural changes and DNA damage by comet assay

The influenza virus generally causes damage to epithelial cells of respiratory tract, and infection of cells with this virus often results in cell death with apoptotic characteristics. Reports are available implicating influenza virus as a causative agent of chromosomal aberrations in cells and culture. The objective of this study was to analyse the process of cell death caused by influenza virus (A/Udorn/317/72, H3N2) infection in cultured HeLa cells by electron microscopy and comet assay. The apoptotic study was performed using light microscopy electron microscopy and comet assay to observe the changes in cell morphology and DNA fragmentation. HeLa cells, infected with influenza virus were harvested at various time periods to observe the ultrastuctural changes. This infection gave rise to nuclear fragmentation and chromatin condensation accompanied by chromosomal DNA fragmentation into oligonucleosomes. The pattern of comet assay revealed that the apoptosis occurred due to fragmentation of the DNA of the cells which reached the maximum level at 36 hours post infection. Ultrastuctural study showed extensive chromatin condensation and nuclear fragmentation which are the characteristic features of apoptosis.

4. Comparison of various immunoassay kits for rapid screening of pandemic influenza (H1N1) 2009 viruses in respiratory specimens

The success of therapeutic measures is predicted on the basis of rapid and precise diagnosis of the infection. A comparison of three rapid influenza immunoassay (RIIA) kits, the Directigen Flu A+B test, QuickVue influenza A+B test and the Quick S-INFLU A.B, for detection of pandemic influenza H1N1 viruses, have been made on patients with flu like syndrome. The sensitivity, specificity and ability to screen influenza type A and type B viruses were evaluated. The pandemic influenza H1N1 (2009) and the reference H1N1 (A/PR/8/34) strains were cultured in MDCK cells to determine $TCID_{50}$ and compared against the current gold standard, real-time RT-PCR. The diagnostic sensitivity of Directigen kit was 10^3 $TCID_{50}$/ml where as the QuickVue and Quick S-INFLU A.B was $10^{3.5}$ $TCID_{50}$/ml in case of the pandemic influenza H1N1 viruses which was comparable to the reference H1N1 viruses (10^3 $TCID_{50}$/ml for QuickVue and Directigen and $10^{3.5}$ $TCID_{50}$/ml for Quick S-INFLU A.B). Our findings suggest that although RIIA kits were not as sensitive as the conventional RT-PCR and real-time RT-PCR yet they are very useful as the preliminary bedside screening tools especially in case of critically ill patients and also when large numbers of samples are to be examined in pandemic situation. These kits differentially detect influenza A from influenza B and this itself saves a lot of time and resources as the pandemic H1N1 test can be done only for influenza A screened cases.

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

A total of 300 nasal and throat swab samples were collected from the month of September 2008 to January 2010 from suspected cases of influenza-like illness from various hospitals of Delhi. 35 samples (11.67%) were confirmed positive for influenza A virus. Of these, 25 samples (8.33%) were seasonal influenza A virus and 10 samples (3.33%) were positive for pandemic influenza A H1N1 (2009) virus. The samples positive for pandemic influenza A H1N1 (2009) virus were tested by real-time RT-PCR assay by using specific primers and probes targeting Influenza A, Swine A and Swine H1 gene. RNA was extracted from all the isolates and subjected to conventional RT-PCR using specific primers for PB1-F2 gene. It was observed that PB1-F2 was amplified in 16 seasonal influenza A virus isolates. The positive PCR products were sequenced and it was observed that 14 sequences were identical (94%-100%) to influenza A/Nagasaki/07N020/2008 (H1N1) and 2 sequences were identical (98% -100%) to influenza A/Managua/1038.01/2008 (H1N1). The PB1-F2 gene was amplified in the samples positive for pandemic influenza A H1N1 (2009) virus. This finding suggested that PB1-F2 is truncated in pandemic influenza A H1N1 (2009) virus. The role of PB1-F2 gene in the pathogenicity of influenza A virus needs to be checked *in vivo* by the use of animal models.

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

Influenza A virus is the common pathogen of the upper respiratory tract that causes widespread infection every year in humans. The non-structural gene, NS1, plays a significant role in the propagation of influenza virus in the host cells. Down regulation of this gene inside the infected cells may help the host immune system to clear the virus and thus reduce the occurrence of disease in an individual. Short interfering RNAs specific to the conserved region of viral genome can potently inhibit influenza virus production. These were developed against NS1 gene and assessed as a tool for transient as well as stable post transcriptional down-regulation of this gene. The NS1 gene was cloned in pSecTag 2A vector and was co-transfected with 30, 40 and 50 pmoles of the designed siRNAs in MDCK cells. The same concentrations of siRNAs were also transfected with the whole virus (Influenza A/PR/8/34) to study the inhibition of replication. RT-PCR and real-time RT-PCR assays followed by western blot analysis confirmed an increase in inhibition of the expression of NS1 gene with an increase in the concentration of siRNA. The maximum inhibition (75%) of the virus replication was observed at 50 pmoles of siRNA. Our study demonstrates that siRNAs can be potently used as an effective agent for down regulating the NS1 gene of the virus.

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

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

The RNA segment 7 of influenza A and B viruses encodes the membrane protein, 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. The virus enters the infected cell by endocytosis, and the interior of the virion must become acidified while it is contained in the endosome as a prerequisite for release of genetic material to the cytoplasm. The proton channels serve this acidification function. Thus, the major objective of this research work is the post transcriptional gene silencing of M2 ion channel to inhibit influenza virus replication. The M2 gene was amplified by after standardisation. The amplified genes were cloned in pGEMT vector and then subcloned in an expression vector pSec Tag 2B. The catalytic nucleic acids are designed based on the secondary structures of RNA derived from RNA M-FOLD software. After the synthesis of catalytic nucleic acids the cloned genes are now being targeted to elucidate the silencing efficacy of DNA enzymes to inhibit the M2 gene. The study is in progress and results are yet to be obtained.

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

The M1 gene of influenza virus codes for the matrix protein which is essential for assembly of virus particles in the host cells. Although the viral genome keeps mutating but there are certain regions in this gene which are evolutionarily conserved among various strains as described by Thomas *et al*, 2006. 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. This 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 cultured in RPMI media. The pure culture of dendritic cells is being sensitised with the purified epitopic proteins by incubating them with proteins.

The naïve T cells were isolated and purified (using the specific magnetic beads from Milteny Biotech) from the PBMC of mice. The sensitised dendritic cells were co-cultured with naïve T cells for the generation of CTLs (Cytotoxic T Lymphocytes). The effectiveness of CTLs was determined by analysing their ability in destroying the virus infected cells. The *in vivo* studies for determining the efficiency of these CTLs to minimise virus infection in mice is under process.

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 2008 - 2010	Session 2009 - 2011
Dr Krishna Pratap Singh	Dr Richa Sareen
Dr Ayush Gupta	Dr Khushboo
Dr Piyush Monoria	Dr Parminder Bir Singh
Dr Saroj K. Meena	Dr Dinesh
Dr Avijit Bansal	Dr Bhola Singh
Dr Anirudh Lochan	Dr Jolsana Augustine
Dr Shreeja Kumar	Dr Suketu P. Dave *(Left on 16.2.2010)*
Dr Mahendra Nagar	Dr Lokesh Kumar Garg
Dr Anil Kumar Jaiswal	Dr A.S. Sandhya
Dr Gladbin Tyagi	Dr Ram Babu Sah

MD Degrees (Awarded)

(Session: 2006-2009)

Name	Discipline
Dr Amit Kumar Lohia	Pulmonary Medicine
Dr Avi Kumar	Pulmonary Medicine
Dr Kripesh Ranjan Sarmah	Pulmonary Medicine
Dr Nurul Haque	Pulmonary Medicine
Dr Rajnish Kaushik	Pulmonary Medicine
Dr Sant Ram	Biochemistry
Dr Jyoti Chaudhary	Microbiology
Dr Mohammed Imran	Pharmacology
Dr Tirpat Deep Singh	Physiology

MD Degrees (Awarded)

(Session: 2007-2009)

Name	Discipline
Dr Hemant Kalra	Pulmonary Medicine
Dr Sunil Kumar Pandita	Pulmonary Medicine

MD Theses (Submitted)

(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 categorized 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 Priti Deep Singh (Physiology)	Autonomic modulation in asthma	Prof. M. Fahim and Prof. S.K. Chhabra

MD Theses (Pursued)

(Session: 2008-2011)

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

MD-Ist Year
(Session: 2009-2012)

Name	Discipline
Dr Brijesh prajapat	Pulmonary Medicine
Dr Chantrakant R. Tarke	Pulmonary Medicine
Dr Loveleen Sharma	Pulmonary Medicine
Dr Mir Elias	Pulmonary Medicine
Dr Suresh Sharma	Pulmonary Medicine
Dr Neetu Bateen	Biochemistry
Dr Ashima Jain	Microbiology
Dr Saurabh Bhatia	Pharmacology
Dr Rajeev Ranjan Mishra	Physiology

PhD Awarded/Submitted

Sl No.	Name (Discipline)	Title of Theses	Supervisor(s)	Status
1.	Mr Mohd. Adnan Kausar (Biochemistry)	Biochemical and clinico-immunologic characterisation of mosquito (*Culex quinquefasciatus*) allergens	Prof. S.K. Bansal, Prof. M.K. Agarwal and Dr V. K. Vijayan	Awarded
2.	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)	Awarded
3.	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)	Awarded
4.	Ms Monika Sharma (Microbiology)	Study the effect of *Mycobacterium tuberculosis* infection of macrophages on T- cell viability	Prof. Mridula Bose and Prof. H.G. Raj	Awarded
5.	Ms Maansi Vermani (Microbiology)	Studies on aerobiological aspects, clinico-immunologic 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	Awarded
6.	Mr Neeraj Kumar Saini (Microbiology)	Functional analysis of mammalian cell entry (*mce*) proteins in mycobacteria	Prof. M. Bose	Awarded
7.	Ms Prachi Gupta (Biochemistry)	Lipid rafts in bronchial asthma: A study on membrane lipid metabolism in asthmatic patients	Prof. S.K. Bansal and Dr V. K. Vijayan	Submitted
8.	Mr Rakesh Kumar Mishra (Biochemistry)	Experimental asthma: A study on transmembrane signaling in airway smooth muscles and peripheral blood lymphocytes during the development of airway hypersensitivity in guinea pigs	Prof. S.K. Bansal, Prof. S.K. Chhabra and Dr Ritu Kulshrestha	Submitted

Sl No.	Name (Discipline)	Title of Theses	Supervisor(s)	Status
9.	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)	Submitted
10.	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)	Submitted
11.	Ms Saakshi Pal Singh (Microbiology)	Studies on detection and characterisation metallo-beta-lactamases in clinical isolates of *Pseudomonas aeruginosa*	Prof. S.S. Thukral and Dr Malini Shariff	Submitted
12.	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	Submitted
13.	Mr Abdul Yasir (Physiology)	Responsiveness of airway rapidly adapting receptors and oxidant-antioxidant status to cigarette smoke inhalation in normal and sensitized rabbits	Prof. K. Ravi and Prof. S.K. Chhabra	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 polyphnolic acetates as antituberculous drugs	Prof. H.G. Raj and Prof. M. Bose	2005
2.	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
3.	Mr Binod Kumar (Microbiology)	Catalytic nucleic acid mediated gene silencing of M2 ion channel of influenza viruses	Dr Madhu Khanna and Dr M.K. Daga (MAMC, New Delhi)	2009
4.	Ms Rashmi Pasricha (Microbiology)	Functional analysis of *lprN* of *mce4* operon of *M. tuberculosis*	Prof. Mridula Bose and Prof. Vani Brahmachari (ACBR, University of Delhi)	2005
5.	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
6.	Mr Rajesh Sinha (Microbiology)	Functional analysis of *mce1a* and *mce4a* gene of *Mycobacterium tuberculosis* H37Rv using overexpression approach	Prof. H.G. Raj , Prof. Mridula Bose and Dr A.K. Prasad (Chemistry Deptt., University of Delhi)	2008
7.	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

Sl No.	Name (Discipline)	Title of Theses	Supervisor(s)	Year of Registration
8.	Mr Binod Kumar (Microbiology)	Catalytic nucleic acid mediated gene silencing of M2 ion channel of influenza viruses	Dr Madhu Khanna and Dr M.K. Daga (MAMC, New Delhi)	2009
9.	Ms Kushal Grima (Microbiology)	Expression analysis and protein profiling of drug efflux transporters in clinical isolates of *M. tuberculosis*	Prof. Mridula Bose and Dr Mandira Varma	2009
10.	Ms Nisha Rathore (Microbiology)	Regulationof expression of *mce4* operon of *M. tuberculosis*: search for upstream promoter activity and regulatory proeins	Prof. Mridula Bose and Dr Mandira Varma	2009
11.	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
12.	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
13.	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
14.	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
15.	Mr Anirudh Vashisht (Physiology)	Behaviour of pulmonary vagal sensory receptors with myelinated afferents during free radicals induced airway hyper-reactivity and its modulation by anti-oxidants in guinea pigs	Prof. K. Ravi, Prof. S.K. Chhabra and Prof. B.D. Banerjee (UCMS, Delhi)	2008
16.	Dr Ritu Kulshrestha (Physiology)	Pathophysiological studies in bleomycin induced pulmonary hypertension and fibrosis in rat model	Prof K.Ravi and Prof A.K. Dinda (AIIMS, New Delhi)	2009

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

Sl No.	Name (Discipline)	Title of Theses	Supervisor(s)	Status
1.	Mr 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	Awarded
2.	Mr Amit Kumar Mehta (Biotechnology)	Evaluation of choline as an anti-inflammatory agent for the treatment of asthma	Dr B.P. Singh, Dr Naveen Arora (IGIB, Delhi) and Prof. S.N. Gaur	Submitted
3.	Ms Deepsikha (Biotechnology)	Studies on allergen specific immunotherapy in patients of respiratory allergy	Dr B.P. Singh, Dr Naveen Arora (IGIB, Delhi) and Prof. S.N. Gaur	Submitted
4.	Mr Prabhjot Singh (Biochemistry)	Studies on the enzymatic propionylation of proteins and related biological effects	Prof. J. Gambhir (Deptt. of Biochemistry, UCMS, Delhi) and Prof. H.G. Raj	Pursued
5.	Ms Prija Ponnan (Computational Biochemistry)	*In silico* studies on structure, functions and application of a novel transace tylase mediating protein acetylation independent of acetyl CoA	Prof. R.C. Rastogi (Chemistry Deptt., University of Delhi) and Prof. H.G. Raj	Pursued
6.	Ms Rashmi Tandon (Chemistry)	Studies on the abtimycobacterial action of polyphenolic peracetates	Dr. Mahendra Nath (Chemistry Deptt., University of Delhi) and Prof. H.G. Raj	Pursued
7.	Ms Rini Joshi (Chemistry)	Studies on protein acetyl transferase function of calreticulin	Prof. D.S. Rawat (Chemistry Deptt., University of Delhi) and Prof. H.G. Raj	Pursued

Sl. No.	Name (Discipline)	Title of Theses	Supervisor(s)	Status
8.	Ms Shipra Gupta (Med. Biochemistry)	Studies on isolation and mechanism of action of the antihyperglycemic and hypolipdemic compound (s) from the leaf extract of *Casssia auriculata* in experimentally induced diabetic animals	Prof. S.B. Sharma, Prof. K.M. Prabhu (UCMS, Delhi) and Prof. S.K. Bansal	Pursued
9.	Ms Monika Joon (Microbiology)	Functional genemics of *mce* operons through the analysis of clinical isolates and knock out strains	Prof. Vani Brahmachari (ACBR, University of Delhi) and Prof. M. Bose	Pursued
10.	Ms Adila Parvin (Physiology)	Free radical mediated cardiovascular dysfunction in chronic heart failure: molecular and systemic mechanisms	Prof. Rashmi Babbar (MAMC, New Delhi) and Dr Anita Kotwani	Pursued

Distinguished Visitors

- Dr Avtar Lal, Drug Regulatory Authority, Govt. of Canada, Ottawa, Canada. Delivered a lecture entitled, "Pharmacology of Myocardial Ischemia-reperfusion Injury" (April 24, 2009).

- Dr. I Zucker, Theodore F. Hubbard Professor, Cardiovascular Research and Chairperson of Department of Cellular and Integrative Physiology, University of Nebraska Medical Center (UNMC), Omaha, NE. Delivered a lecture entitled, "Central Angiotensin Receptor Regulation and Sympathetic Function in Heart Failure" (January 11, 2010).

- Prof. U.C. Chaturvedi, INSA Honorary Scientist, C.S.M. Medical University, Lucknow, visited the Respiratory Virology Department (April 8, 2009).

Awards/Honours

Dr V.K. Vijayan

- **President,** Indian College of Allergy, Asthma and Applied Immunology, Dehi (Up to December 2008).
- **Founder President,** South Asian Association of Allergy, Asthma and Clinical Immunology.
- **Member,** Executive Council, University of Delhi.
- **Vice President,** World Lung Foundation-South Asia.
- **Chair, Clinical Respiratory Medicine Assembly,** Asian Pacific Society of Respirology.
- **Vice President,** Pulmonary Pathology Society of India.
- **Member,** Executive Committee, Tuberculosis Association of India.
- **Editor-in-Chief and Publisher**, *Indian Journal of Chest Diseases & Allied Sciences*, an official publication of the V.P. Chest Institute and the National College of Chest Physicians (India).
- **Member,** Scientific Advisory Committee, National Institute of Occupational Health (ICMR), Ahmedabad.
- **Member,** Education Council, World Allergy Organisation (2008-09).
- **Member,** Editorial Advisory Board, *Chest*, an official publication of the American College of Chest Physicians, U.S.A.
- **Member,** Editorial Board, World Allergy Organisation Journal.
- **Member,** Scientific Advisory Committee, New Delhi Tuberculosis Centre.
- **Expert Member,** Multicentric Task Force Project on "Study on epidemiology of asthma and atopy in adults", ICMR, New Delhi.
- **Member,** Technical Advisory Committee on Child Labour, Ministry of Labour and Employment, Government of India.
- **Member**, Selection Committee for the Award of Post-doctoral Research Fellowship of the Indian Council of Medical Research, New Delhi.
- **Member**, Indian Sleep Board to certify Sleep Physicians in India through examination in association with American Academy of Sleep Medicine.
- **Member**, Expert Committee, Project Review Group (PRG) for Indo-US Proposals in the area of "Environment and Occupational Health" ICMR, New Delhi.
- **Membe**r, Board of Specialty in Infectious Diseases of Medical Council of India to develop curriculum in the specialty of Infectious Diseases.
- **Member,** National Workshop on "Alternative Model for Undergraduate Medical Education" by the Medical Council of India, New Delhi.
- **Inspector,** National Board of Examinations to inspect Amrita Institute of Medical Sciences & Research Centre, Kochi for continuation of DNB course in Respiratory Medicine.
- **Member,** Expert Group to review the "Report of cancer in MIC affected and unaffected areas in Bhopal", ICMR, New Delhi.
- **Chairman**, Project Review Committee for the Division of NCD for the area of Environment, ICMR, New Delhi.
- **Chairman**, Expert committee to recommend improvement of health care services of World University Service (WUS) Centre of University of Delhi, Delhi.

- **Member,** Data Safety Monitoring Bureau (DSMB), Department of Biotechnology (BDT) project on Efficacy and safety of immunomodulatory *Mycobacterium w.* as an adjunct therapy in pulmonary tuberculosis.
- **Member**, Technical Advisory Committee of the ICMR Centre for Advance Research in Environment-Air Pollution at Sri Ramachandra University, Chennai.
- **Member**, Scientific Advisory Board, the UCB Academy of Allergy, Mumbai.
- **Chairman**, Institutional Ethics Committee, LRS Institute of Tuberculosis & Respiratory Diseases, Mehrauli, New Delhi.
- **Referee** to evaluate the candidate for the Shanti Swarup Bhatnagar Prize 2009 of the Council of Scientific and Industrial Research in Medical Sciences.
- **Expert** to evaluate CSIR (EMR) Emeritus Scientist project.
- **Member**, Inspection Committee of University of Delhi to recommend the BSc (Nursing) course at Holy Family Hospital, New Delhi on 14 January 2010.
- **Member,** Expert Committee to review the "Concept and Rejuvenation Formulations in Regenerative Medicine" at ICMR, New Delhi.
- **Judge** to evaluate the best paper presentation at "UCB-ICAAI Young Scientist Award Session" at the 43rd Annual Conference of the Indian College of Allergy, Asthma and Applied Immunology", Chandigarh.
- **Expert Member**, Project Progress Review meeting for the project entitled "Development of novel biomedical products with particular reference to defence forces using nuclear medicine techniques at Institute of Nuclear Medicine and Allied Sciences, Delhi.
- **Founder Member,** Association of Physicians of SAARC Countries, Dhaka.
- **Member,** Editorial Advisory Board, *Chest* (Indian Edition), an official publication of the American College of Chest Physicians, U.S.A.
- **Member,** Editorial Advisory Board, *Thorax* (South Asian Edition), an official publication of the British Thoracic Society, U.K.
- **Member,** Editorial Board, *The Open Respiratory Medicine Journal*, an Open Access online Journal.
- **Member,** Editorial Board, *Lung India*, an official publication of the Indian Chest Society.
- **Member,** Editorial Board, *Indian Journal of Tuberculosis*, an official publication of the Tuberculosis Association of India.
- **Member,** Editorial Board, *Indian Journal of Allergy*, *Asthma and Immunology*, an official publication of the Indian College of Allergy, Asthma and Applied Immunology.
- **Member, Editorial Advisory Committee,** *Pulmon*, an official publication of the Academy of Pulmonary and Critical Care Medicine.
- **Member, Editorial Board,** *Indian Journal of Bronchology*, an official publication of the Indian association for Bronchology.
- **Member, Editorial Board,** *Indian Journal of Sleep Medicine*, an official publication of the Indian Sleep Disorders Association.
- **Judge** to select the best free paper poster at the Congress on "Total Lung Health" organised by the Bangladesh Lung Foundation and the Bangladesh Society of Allergy & Immunology (BANSAI), 14-15, October 2009.
- **Expert Member,** Selection Committee for the selection of Chest Specialist at LRS Institute of Tuberculosis and Respiratory Diseases, Mehrauli, New Delhi.

Prof. H.G. Raj

- **Patents Filed:**

  (i) International Application No. PCT/IN2009/000344,
  Applicant: University of Delhi & Vallabhbhai Patel Chest Institute
  Title: "Dihydropyrimidinone Compounds for the Treatment of Cardiovascular Diseases and process for preparing the same".

  (ii) International Application No. PCT/IN2009/000359
  Applicant: University of Delhi and Vallabhbhai Patel Chest Institute
  Title: "Coumarin Compounds For the Treatment of Cardiovascular Diseases and a Process for Preparing the Same"

Prof. S.N. Gaur

- **Editor,** *Indian Journal of Allergy*, *Asthma and Immunology*, an official publication of the Indian College of Allergy, Asthma and Applied Immunology.
- **Secretary,** National College of Chest Physicians (India).
- **Expert Member**, Committee on Prevention, Abatement and Control of Pollution, Ministry of Environment & Forest, Government of India.
- **Member,** Auto-immunity , Immunomodulation and Secondary Immune Deficiency Committee and *Autoimmunity*, *Anaphylaxis*, *Immunotherapy*, *Allergen standardization and Allergy Diagnostic and Adverse Reaction to Food allergy*, *Air pollution and Indoor Allergen Committees*, American Academy of Allergy, Asthma and Immunology.
- **Expert,** Selection Committee, DNB Course, LRS Institute of Tuberculosis and Respiratory Diseases, New Delhi.
- **Expert,** Selection Committee for promotion to professor in Pulmonary Medicine, CSM Medical University, Lucknow, Uttar Pradesh.
- **Member,** DOTS Plus Committee, DDG (TB), Government of India, New Delhi.
- **Member,** Standing Technical Committee, Tuberculosis Association of India, New Delhi.
- **Member,** Advisory Board, Delhi Tuberculosis Association, New Delhi.

Prof. A. Ray

- **Member,** Institutional Ethical Committee, Rajan BabuTB Hospital, Govt. of Delhi, Delhi.
- **Member,** Institutional Ethical Committee, Defence Institute of Physiology and allied Sciences (DIPAS), Defence Research Development Organisation (DRDO), Delhi.
- **Member,** Sub-committee for Preclinical evaluation of herbal drugs of the Department of Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy (AYUSH).
- **Member,** Expert Committee, Central Council for Research in Unani Medicine (CCRUM), (AYUSH).
- **Member,** Expert Committee, Central Council for Research In Homoeopathy, (AYUSH).
- **Expert,** Project Advisory Committee Member, Defence Research Development Organisation (DRDO), Delhi.
- **Expert Member,** DST WOS- A Scheme Sensitiztion Programme (Govt. of India), *a)* SNDT University University, Mumbai and *b)* JNTU, Kakinada.
- **Visiting Scientist,** at the Departments of Pharmacology, a) University of Minnesota at Minneapolis, MN, USA (June2009) and b) University of Illinois at Chicago, Chicago, IL, USA (July 2009).

Prof. Ashok Shah

- **Editor**, *Indian Journal of Chest Diseases & Allied Sciences*, an official publication of the V.P. Chest Institute and the National College of Chest Physicians (India).
- **Associate Editor,** *Indian Journal of Tuberculosis*, an official publication of the Tuberculosis Association of India.
- **Member,** Editorial Board, *European Respiratory Reviews.*
- **Member,** Editorial Board, *Clinical and Molecular Allergy*.
- **Member,** Editorial Board, *Open Allergy Journal.*
- **Member,** Editorial Advisory Board, *Chest* (Indian Edition), an official publication of the American College of Chest Physicians, U.S.A.
- **Member,** Editorial Board, *Indian Journal of Allergy*, *Asthma and Immunology*, an official publication of the Indian College of Allergy, Asthma and Applied Immunology.
- **Member,** Editorial Board, *Lung India*, an official publication of the Indian Chest Society.
- **Member,** Editorial Board, *Current Medical Trends*.
- **Member,** Technical Screening Committee of Biotech Consortium India Limited (BCIL).
- **Technical Member,** Purchase Board, Municipal Corporation of Delhi (Health Department) for the purchase of machines for pulmonary function testing.
- **Expert Member,** Selection Committee, DNB Respiratory Medicine, Sir Ganga Ram Hospital, New Delhi.
- **Member,** World Allergy Organisation Speciality and Training Council, and Audit & finance Committee.
- **Member Society Representative,** Asia Pacific Association of Allergy, Asthma and Clinical Immunology.

Prof. S.K. Chhabra

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

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.

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 for assessment of Group II Group III Technical Staff in Institute of Genomics and Integrative Biology, Delhi.

- **Panel of Experts,** Council of Science & Technology, U.P. Lucknow, for evaluation of research proposal for grant-in-aid.
- **Panel of Experts,** Council of Medical Research for evaluation of U.P. Lucknow, for evaluation of research proposal for grant-in-aid.

Prof. Raj Kumar

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

Dr Madhu Khanna

- Received **AGD Bronze Prize** for the oral presentation on the topic entitled "A Combinatorial Antiviral Approach Against Influenza A Virus using Ribozyme and siRNA" in the Third Ditan International Conference on Infectious Disease held at Beijing International Convention Centre, Beijing, China, July 30 - August 2, 2009.
- **Editor**, *Indian Journal of Virology*.

Dr Anuradha Chowdhary

- **Awarded ICMR International Fellowship** to work on project entitled, "Molecular characterization of environmental and clinical strains of *Cryptococcus gattii* and *Cryptococcus neoformans* isolated in India" at Molecular Mycology Laboratory, Department of Biology, McMaster University, Hamilton, Ontario, Canada, July- Sept., 2009
- **Awarded Dr. Shriniwas best paper** for a joint paper entitled, "Antifungal susceptibility profile and molecular typing of *Cryptococcus neoformans* and *C. gattii* isolates from India" (by Anuradha Chowdhary, H.S. Randhawa, G. Sundar, T. Kowshik, Z.U. Khan, S. Sun, S.S. Hiremath, J.P. Xu) at Annual Congress of Indian Association of Medical Microbiologists (IAMM), Delhi Chapter, Lady Hardinge Medical College, New Delhi, December 5, 2009.
- **Awarded a poster paper prize** for a joint paper entitled, "Evaluation of hypertonic Sabouraud's glucose ag \pjh as a reliable medium for differentiation of *Candida dubliniensis* from *Candida albicans*" (by Anuradha Chowdhary A, H.S.Randhawa, T. Kowshik, Shallu Kathuria, P. Roy, Mary E. Brandt) at VIII National Conference of Society for Indian Human and Animal Mycologists, (SIHAM 2010), A.I.I.M.S., New Delhi, March 4-6, 2010.

Dr Anita Kotwani

- **Member,** Expert Committee, UGC, to evaluate the applications of Indian teachers/scholars for study-cum-research, exchange program.
- **Member,** Expert Group, Indian Council of Medical Research to discuss spurious, adulterated and misbranded drugs.

- **Member,** National Working Group of the Global Antibiotic Resistance Partnership (GARP)-India.
- **Executive Member,** International Society for Pharmacoeconomics and Outcome Research (ISPOR), Indian Chapter.
- **Member,** Committee of Courses and Studies for Honours, Postgraduate and Research Studies in Biomedical Sciences of Dr B.R. Ambedkar Center for Biomedical Research, University of Delhi, Delhi.

Dr Kavita Gulati

- **Dr B.N. Ghosh Memorial Oration,** I International Conference on Integrative and Personalized Medicine and 42 Annual Conference of Indian Pharmacological Society (IPSCON-2009), Kolkata, December 10-12, 2009.
- **Expert,** Project Evaluation Committee, Central Council for Research in Homoeopathy, (AYUSH).
- **Judge** for prize in a scientific (poster) session, International Conference on Integrative and Personalized Medicine and 42 Annual Conference of Indian Pharmacological Society (IPSCON-2009), Kolkata, December 10-12, 2009.

Dr Ritu Kulshrestha

- **Geraldine Zeiler Fellowship and Visiting Clinician**, Mayo Clinic, Scottsdale, Arizona, USA in the Department of Pathology, under the direction of Dr. Thomas Colby, Dr. Kevin Leslie and colleagues. May 26 - June 26, 2009.

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 (Two years & three months)	57.28 Lakhs
2.	Prof. H.G. Raj (Biochemistry)	Studies on the synthesis of acyloxy polyphenols, the substrates for calreticulin transacylase: molecular mechanisms of acylation of functional proteins by acyloxy polyphenols utilising recombinant clones of C, P and N domains of calreticulin	DU/DST – Purse Grant University of Delhi December 11, 2009 (One year and three months)	11.80 Lakhs
3.	Prof. S.K. Bansal (Biochemistry)	Pharmacogenomics of bronchial asthma: a study on polymorphism in B2 adrenoreceptor (ADRB2) and corticotrophin releasing hormone receptor 1 (CRHR1) genes in responders non-responders to salbutamol and budesonide	D.B.T. March 22, 2010 (Three years)	62.31 Lakhs
4.	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
5.	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
6.	Prof. S.K. Chhabra (Cardiorespiratory Physiology)	Heart rate variability in chronic obstructive pulmonary disease: associations with systemic inflammation and clinical implications	D.S.T. February 18, 2010 (Three years)	31.67 Lakhs
7.	Dr Vishwajeet Rohil (Clinical Biochemistry)	Studies on implications of epigenetic modulation due to histone hyperacetylation in tumor cells induced by drugs targeting protein acetylation system through a novel mechanism	U.G.C. January 18, 2010 (Three years)	9.90 Lakhs

Sl No.	Faculty Member (Department)	Title of Project	Funding Agency, Date of Sanction/Implementation and Duration	Budget (in Rs.)
8.	Dr Vishwajeet Rohil (Clinical Biochemistry)	To evaluate the molecular mechanism of development of COPD in smokers in north Indian population	I.C.M.R. March 29, 2010 (Three years)	17.28 Lakhs
9.	Dr Anuradha Chowdhary (Medical Mycology)	Systemic mycoses in HIV positive patients: a study of species spectrum of etiologic agents, antifungal susceptibility pattern and epidemiologic aspects	I.C.M.R. March 1, 2009 (Three years)	15.82 Lakhs
10.	Dr Anuradha Chowdhary (Medical Mycology)	A study of genetic heterogeneity and molecular ecology of *Cryptococcus neoformans* and *Cryptococcus gattii*	D.S.T. June 3, 2009 (Three years)	39.35 Lakhs
11.	Prof. S.S.Thukral (Retd.) (Microbiology) 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
12.	Prof. Mridula Bose (Microbiology)	Functional characterisation of *lspA* gene of *M. tuberculosis*: cloning, expression and its role during pathogenesis	D.B.T. June 19, 2006 (Four years)	23.42 Lakhs
13.	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
14.	Prof. Mridula Bose (Microbiology)	Prospects for the development of anti-ubercular drugs based on transacetylase function of glutamine synthase	D.B.T. May 17, 2007 (Three years)	53.38 Lakhs
15.	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)	28.69 Lakhs
16.	Dr Malini Shariff (Microbiology)	Evaluation of phenotypic and genotypic methods for the detection and characterisation of metallo-β-lactmasses in clinical isolates of *Pseudomonas aeruginosa*	C.S.I.R. November 20, 2007 (Three years)	15.01 Lakhs

***** *Presently looking after the project*

Sl No.	Faculty Member (Department)	Title of Project	Funding Agency, Date of Sanction/Implementation and Duration	Budget (in Rs.)
17.	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
18.	Dr Mandira Varma (Microbiology)	Rapid identification of Mycobacteria to the species level by PCR restriction analysis in clinical samples	I.C.M.R. January 16, 2008 (Two years and four months)	10.62 Lakhs
19.	Dr Mandira Varma (Microbiology)	Drug resistance profiling and molecular typing of *M. tuberculosis* isolates from different community settings in North Delhi	I.C.M.R. March 22, 2010 (Three years)	13.43 Lakhs
20.	Prof. A. Ray (Pharmacology)	Studies on the possible mechanisms involved in the effects of UNIM-352, a polyherbal, anti-asthmatic unani preparation in experimental animals	Department of Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy (AYUSH) September 29, 2006 (Three years)	28.29 Lakhs
21.	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)	6.5 Lakhs
22.	Prof. A. Ray (Pharmacology)	A study to assess the efficacy of UNIM-352 (ZN_5) in bronchial asthma	Central Council for Research in Unani Medicine (CCRUM) March 11, 2005 (Five years and nine months)	5.71 Lakhs
23.	Dr Anita Kotwani (Pharmacology)	Continued surveillance of antimicrobial resistance and use in the community and in-depth qualitative investigation for behaviour of antimicrobial drugs use for suitable interventions for rational use of antibiotics	W.H.O. August 27, 2007 (Three years and four months)	7.04 Lakhs
24.	Dr Kavita Gulati (Pharmacology)	Pharmacological studies on the role of nitric oxide (NO) in stress adaptation in rats	D.S.T. March 29, 2005 (Four years and six months)	16.26 Lakhs

Sl No.	Faculty Member (Department)	Title of Project	Funding Agency, Date of Sanction/Implementation and Duration	Budget (in Rs.)
25.	Dr Kavita Gulati (Pharmacology)	Pharmacological studies on the possible role of nitric oxide (NO) and NO-mediated signalling pathways in the regulation of stress induced immunological changes in rats	I.C.M.R. September 29, 2009 (Three years)	15.01 Lakhs
26.	Prof. M. Fahim (Retd.) (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
27.	Prof. M. Fahim (Retd.) (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 and seven months)	13.32 Lakhs
28.	Prof. K. Ravi (Physiology)	Correlation between hypoxic/restraint responses and NO-ergic mechanisms	D.I.P.A.S. May 5, 2008(One year)	4.86Lakhs
29.	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
30.	Prof. K. Ravi (Physiology)	Brain nitric oxide and high altitude stress	D.I.P.A.S. February 9, 2010 (Three years)	59.00 Lakhs
31.	Prof. M.K. Agarwal (Retd.) (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 Tobacco
32.	Prof. Raj Kumar (Respiratory Allergy and Applied Immunology)	Tobacco Cessation Clinic at V.P. Chest Institute and conducting related activities	W.H.O. January 27, 2006, February 05, 2007, January 01, 2008, January 01, 2009 (Four years)	9.64 Lakhs
33.	Prof. Raj Kumar (Respiratory Allergy and Applied Immunology)	To study the prevalence of obstructive sleep apnoea amongst middle aged chronic obstructive airway disease (COPD and asthma) patients by a home based sleep study and atopy	U.G.C. December 3, 2009 (Three years)	11.55 Lakhs

***** *Presently looking after the project*

Sl No.	Faculty Member (Department)	Title of Project	Funding Agency, Date of Sanction/Implementation and Duration	Budget (in Rs.)
34.	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
35.	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 six months)	46.96 Lakhs
36.	Dr Madhu Khanna (Respiratory Virology)	Multi-site monitoring of human influenza in India - Phase I	I.C.M.R. November 8, 2006 (Three years and nine months)	81.92 Lakhs
37.	Dr Madhu Khanna (Respiratory Virology)	A study of viral replication inhibition by down regulation of NS1 gene of influenza A virus	C.S.I.R. November 16, 2007 (Three years)	16.74 Lakhs
38.	Dr Madhu Khanna (Respiratory Virology)	Multi-site epidemiological and virological monitoring of human influenza virus surveillance network in India –Phase II	I.C.M.R. February 16, 2010 (One year)	41.20 Lakhs
39.	Dr Ajit Kumar DST's SERC Fast Track Scheme for Young Scientist (Biochemistry)	Studies on molecular mechanismof calreticulin transacetylase (CRT Ase) catalysed activation of nitrc oxide synthase and its biological implications	D.S.T. January 04, 2008 (Three years)	19.94 Lakhs
40.	Dr Garima Gupta DST's SERC Fast Track Scheme for Young Scientist (Biochemistry)	Prospects for the development of polyphenolic acetates as the antitubercular drugs based on their possible action on cell wall components	D.S.T. August 19, 2009 (Three years)	20.00 Lakhs
41.	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 crythrocyte membrane as model	I.C.M.R. November 08, 2007 (Two years)	4.44 Lakhs

Sl No.	Faculty Member (Department)	Title of Project	Funding Agency, Date of Sanction/Implementation and Duration	Budget (in Rs.)
42.	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
43.	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 (Ten years)	4.25 Lakhs

Orations/Guest Lectures

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
1.	Dr V.K. Vijayan	Respiratory effects of Bhopal gas disaster	V.P.C.I. University of Delhi	National Seminar on "Environmental Lung Diseases" on the occasion of the foundation day of the Vallabhbhai Patel Chest Institute, Delhi April 6, 2009
2.	Dr V.K. Vijayan	Nuts and bolts of management of bronchial asthma	A.I.I.M.S. and API Delhi State Chapter	Medicine Update 2009 New Delhi August 9, 2009
3.	Dr V.K. Vijayan	Pathophysiology and management of obstructive sleep apnea syndrome	Association of Physicians, Bhopal	7th National Conference on Cardiology, Diabetology, Electrocardiology, Echocardiology & Critical Care Hotel Jehan Numa Palace Shamla Hills Bhopal October 3-4, 2009
4.	Dr V.K. Vijayan	Sleep apnea: Indian experience	Bangladesh Lung Foundation and the Bangladesh Society of Allergy & Immunology (BANSAI)	Congress on Total Lung Health Bangabandhu International Conference Centre Dhaka, Bangladesh October14-15, 2009
5.	Dr V.K. Vijayan	Obstructive sleep apnea: pathogenesis	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2009) Calicut November 5-8, 2009
6.	Dr V.K. Vijayan	Therapeutic use of nitric oxide in cardio-respiratory diseases	Indian Pharmacological Society	42nd Annual Conference of Indian Pharmacological Society Kolkata December 10-12, 2009

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
7.	Dr V.K. Vijayan	Cardio-pulmonary consequences of obstructive sleep apnea syndrome	Delhi Pharmaceutical Sciences & Research University	Joint International Conference of International Society for Heart Research & International Academy of Cardiovascular Sciences (India Section) New Delhi February 3-4, 2010
8.	Dr V.K. Vijayan	Bronchoalveolar lavage: techniques and its pitfalls	Indian Association for Bronchology	15th Annual Conference of the Indian Association for Bronchology Agra February 5-7, 2010
9.	Dr V.K. Vijayan	Oxidative stress and anti-oxidant treatment in obstructive sleep apnea syndrome	Biotechnology Society of India	14th Foundation Day Oration of the Biotechnology Society of India PGIMER and Dr RML Hospital New Delhi February 24, 2010
10.	Dr V.K. Vijayan	Respiratory effects of Bhopal gas disaster	Defence Institute of Physiology & Allied Sciences (DIPAS)	National Science Day Oration Delhi February 26, 2010
11.	Prof. H.G. Raj	Characterisation of polyphenolic acetate as the enhancer of intracellular nitric oxide: mechanism and biological implications	Department of Chemistry, University of Delhi and Embassy of Italy	5th Indo-Italian Workshop on Chemistry and Biology of Antioxidants Rome, Italy July 6-8,2009
12.	Prof. H.G. Raj	Polyphenolic acetates: antioxidant and other pharmacological applications	Defence Institute of Physiology and Allied Sciences	Defence Institute of Physiology and Allied Sciences Delhi November 16, 2009
13.	Prof. H.G. Raj	Oxidative stress and injury: terminus a quo of chronic obstructive pulmonary diseases (COPD)	Department of Chemistry, University of Delhi	6th Indo-Italian Workshop on Chemistry and Biology of Antioxidants Delhi December 10-11, 2010

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
14.	Prof. H.G. Raj	Development of polyphenolic acetates as a novel antiplatelet agent	Department of Chemistry, University of Delhi	International Symposium on Trends in Drug Discovery and Development Delhi January 5-8, 2010
15.	Prof. S.N. Gaur	Global warming and respiratory health	Department of Tuberculosis and Respiratory Diseases, S. P. Medical College and Rajasthan Chapter of National College of Chest Physicians India	8th State Conference of Tuberculosis and Respiratory Diseases, Rajasthan Chapter of National College of Chest Physicians, India (NCCP RAJCON 2009) Hotel Basant Vihar Palace, Bikaner April 4-5, 2009
16.	Prof. S.N. Gaur	Immunotherapy for allergic diseases: present scenario	Government Medical College	43rd Annual Conference of the Indian College of Allergy, Asthma and Applied Immunology (ICAAICON 2009) Chandigarh October 1-4, 2009
17.	Prof. S.N. Gaur	Global warming and its effect on lung	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON 2009) Calicut November 5-8, 2009
18.	Prof. S.N. Gaur	Immunotherapy – current guidelines in bronchial asthma	Department of Pulmonary Medicine, Geetanjali Medical College and Hospital (GMCH) and Rajasthan Chapter of National College of Chest Physicians India	9th Annual Conference of the Rajasthan Chapter of National College of Chest Physicians India (NCCP RAJCON 2010) Udaipur March 13-14, 2010
19.	Prof. A. Ray	Pharmacology of CNS-immune interactions during stress	Department of Pharmacology, University of Minnesota	Department of Pharmacology, University of Minnesota, Minneapolis, MN, USA June 26, 2009

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
20.	Prof. A. Ray	Pharmacology of CNS-immune interactions during stress	Department of Pharmacology, University of Illinois	Department of Pharmacology, University of Illinois, Chicago, Illinois, IL, USA July 2, 2009
21.	Prof. A. Ray	Current trends in nitric oxide research	Defence Institute of Physiology and Allied Sciences	CEP Programme on Oxidative Stress in Health and Disease Delhi November 18-25, 2009
22.	Prof. A. Ray	Some practical issues in pharmacovigilance: signal detection and causality assessment	Society of Pharmacovigilance (India)	9th Annual Conference of Society of Pharmacovigilance (India) Sirsa, Haryana November 20-22, 2009
23.	Prof. A. Ray	Recent studies on the efficacy and safety of methylxanthines	Indian Pharmacological Society	International Conference on Integrative and Personalized Medicine and 42nd Annual Conference of Indian Pharmacological Society (IPSCON-2009) Kolkata December 10-12, 2009
24.	Prof. A. Ray	Nitric oxide: its role beyond the cardiovascular system	Delhi Institute of Pharmaceutical Sciences and Research	Symposium on Cardiovascular Sciences New Delhi December 16, 2009
25.	Prof. A. Ray	Modulation by nitric oxide (NO) of neurobehavioral and immunological responses during stress	Society for Free Radical Research (SFRR)	International Conference on Advances in Free Radical Research and 9th Annual Conference of the Society for Free Radical Research (SFRR) Hyderabad January 11-13, 2010

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
26.	Prof. A. Ray	Nitric oxide: a pleotropic regulator of health and disease	Delhi Institute of Pharmaceutical Sciences and Research	Joint International Conference of International Society for Heart Research & International Academy of Cardiovascular Sciences (India Section) New Delhi February 3-4, 2010
27.	Prof. A. Ray	Nitric oxide: a pleotropic regulator of health and disease	ITM Universe and DRDE, (DRDO)	National Seminar on Biotechnology and Health Gwalior March 19-20, 2010
28.	Prof. Mridula Bose	Emerging infectious diseases	Miranda House, University of Delhi	Add-on Course on Medical Biotechnology Delhi September 11, 2009
29.	Prof. Mridula Bose	Identification and validation of single nucleotide polymorphism in the *mca* operon of *M. tuberculosis* isolates	Council of Scientific & Industrial Research	Indo-Bay Area (LA) TB Summit New Delhi January 11-13, 2010
30.	Prof. Ashok Shah	Sarcoidosis: Indian scenario	Department of Tuberculosis and Respiratory Diseases, S. P. Medical College and Rajasthan Chapter of National College of Chest Physicians India	8th State Conference of Tuberculosis and Respiratory Diseases, Rajasthan Chapter of National College of Chest Physicians, India (NCCP RAJCON 2009) Hotel Basant Vihar Palace, Bikaner April 4-5, 2009
31.	Prof. Ashok Shah	• How to do a literature search? • Sarcoidosis – How do we see it in India? • Anaerobic lung infections	National Allergy Asthma Bronchitis Institute	1st Annual Conference of the National Allergy Asthma Bronchitis Institute Indian Science Congress House, Kolkata July 4 -5, 2009

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
32.	Prof. Ashok Shah	One airway, one disease	Government Medical College	43rd Annual Conference of the Indian College of Allergy, Asthma and Applied Immunology (ICAAICON 2009) Chandigarh October 1-4, 2009
33.	Prof. Ashok Shah	Sarcoidosis-current perspective	Department of Academics & Health Research, AMRI Hospitals	National Conference on Recent Advances in Medical Specialties, AMRICON 2009 Science City Auditorium, Kolkata October 10-11, 2009
34.	Prof. Ashok Shah	Ethnic and geographical variation in the presentation of sarcoidosis	Yugoslav Association of Sarcoidosis	IX Assembly of the Yugoslav Association of Sarcoidosis, International Conference on Multisystem Sarcoidosis Belgrade, Serbia October 15-16, 2009
35.	Prof. Ashok Shah	Allergic bronchopulmonary aspergillosis	European Confederation of Medical Mycology (ECMM) and Infectious Diseases Group of the European Organisation for Research and Treatment for Cancer (IDG-EORTC)	4th Trends in Medical Mycology (TIMM-4) of the European Confederation of Medical Mycology (ECMM) Hilton Athens, Athens, Greece, October 18-21, 2009
36.	Prof. Ashok Shah	Delivered NCCP Cipla Oration on *Aspergillus* associated hypersensitivity respiratory disorders	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2009) Calicut November 5-8, 2009

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
37.	Prof. Ashok Shah	Allergic bronchopulmonary aspergillosis	Department of Ocular Microbiology, All India Institute of Medical Sciences	8th National Conference of Society for Indian Human and Animal Mycology (SIHAM 2010) New Delhi March 4-6, 2010
38.	Prof. Ashok Shah	Allergic bronchopulmonary aspergillosis: diagnostic algorithm	Department of Pulmonary Medicine, Geetanjali Medical College and Hospital (GMCH) and Rajasthan Chapter of National College of Chest Physicians India	9th Annual Conference of the Rajasthan Chapter of National College of Chest Physicians India (NCCP RAJCON 2010) Udaipur March 13-14, 2010
39.	Prof. Ashok Shah	Rationale of treatment of tuberculosis	Department of Medicine, Hindu Rao Hospital	World Tuberculosis Day organized by the Delhi March 26, 2010
40.	Prof. S.K. Chhabra	Air pollution and its adverse effect on health	Tricord, The Life Sciences Society of Miranda House	Miranda House University of Delhi, Delhi September 18, 2009
41.	Prof. S.K. Chhabra	Public health challenges of air pollution	Centre for Science and Environment	Orientation programme on Managing Urban air Quality in India New Delhi December 21-24, 2009
42.	Prof. S.K. Chhabra	Climate change and respiratory effects	National Physial Laboratory	SERC School on Atmospheric Chemistry and Air Pollution New Delhi March 2-21, 2010
43.	Dr Raj Kumar	ETS and child's lung	V.P.C.I. University of Delhi	National Seminar on "Environmental Lung Diseases" on the occasion of the foundation day of the Vallabhbhai Patel Chest Institute Delhi April 6, 2009

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
44.	Dr Raj Kumar	Smoking at work place	Indian Association of Occupational & Environmental Health	Seminar on Smoking at Work Place India Habitat Centre New Delhi July 19, 2009
45.	Dr Raj Kumar	Food allergy in bronchial asthma- Indian perspective	Bangladesh Lung Foundation	Total Lung Health 2009 Dhaka, Bangladesh August 18-20, 2009
46.	Dr Raj Kumar	Food allergy in bronchial asthma	Government Medical College	43rd Annual Conference of the Indian College of Allergy, Asthma and Applied Immunology (ICAAICON 2009) Chandigarh October 1-4, 2009
47.	Dr Raj Kumar	Smoking cessation – strategies and problems	Tuberculosis Assocation of India	4th National Conference of Tuberculosis and Chest Diseases (NATCON-2009) National Science Centre, Kolkata, December 27-29, 2009
48.	Dr Balakrishnan Menon	HRCT in interstial lung diseasess	Babu Jagjivan Ram Hospital	Respiratory Update New Delhi August 23, 2009
49.	Dr Balakrishnan Menon	Novel pharmacological approaches in asthma	Government Medical College	43rd Annual Conference of the Indian College of Allergy, Asthma and Applied Immunology (ICAAICON 2009) Chandigarh October 1-4, 2009
50.	Dr Mandira Varma	Rapid molecular diagnostic techniques	Miranda House, University of Delhi	Add-on Course on Medical Biotechnology Delhi September 11, 2009
51.	Dr Mandira Varma	Primer and probe designing	Indian Association of Medical Microbiologists (Delhi Chapter)	Annual Conference of Delhi Chapter of Indian Association of Medical Microbiologists India Habitat Center, New Delhi March 12-13, 2010

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
52.	Dr Anuradha Chowdhary	Molecular ecology of *Cryptococcus neoformans* and *Cryptococcus gattii* in India	Society for Indian Human and Animal Mycologists (SIHAM 2010)	VIII National Conference of Society for Indian Human and Animal Mycologists (SIHAM 2010) AIIMS, New Delhi March 4-6, 2010
53.	Dr Anuradha Chowdhary	Systemic mycoses: present scenario and the need for early diagnosis	INSA-International Union of Microbiological Societies (IUMS)	Brain Storming Session on Fungal Diseases, INSA- IUMS, Indian National Science Academy (INSA) Bahadur Shah Zafar Marg New Delhi March 7, 2010
54.	Dr Anita Kotwani	Surveillance of antibiotic use in the community	Global Antibiotic Resistance Partnership (GARP-India)	Global Antibiotic Resistance Partnership (GARP-India) New Delhi August 24-25, 2009
55.	Dr Anita Kotwani	Need for improving access to essential medicines and treatment behavior to chronic diseases during a symposium on "Access to medicines"	Indian Pharmacological Society	International Conference on Integrative and Personalized Medicine and 42 Annual Conference of Indian Pharmacological Society (IPSCON-2009) Kolkata December 10-12, 2009
56.	Dr Anita Kotwani	Access issues: pricing studies and essential medicine list	WHO-SEARO (South-East Asia Regional Office)	WHO-SEARO Meeting on Better Medicines for Children New Delhi February 3, 2010
57.	Dr Kavita Gulati	Role of oxidative stress in drug and xenobiotic induced toxicity	Defence Institute of Physiology and Allied Sciences	CEP Programme on Oxidative Stress in Health and Disease Delhi November 18-25, 2009

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
58.	Dr Kavita Gulati	Pharmacovigilance in obstructive airway disease: focus on theophylline	Society of Pharmacovigilance (India)	9th Annual Conference of Society of Pharmacovigilance (India) Sirsa, Haryana November 20-22, 2009
59.	Dr Kavita Gulati	Dr BN Ghosh Memorial Oration on Role of free radicals in the toxicodynamics of drugs and xenobiotics Reverse pharmacology in respiratory medicine : an experience with a herbal formulation	Indian Pharmacological Society	International Conference on Integrative and Personalized Medicine and 42 Annual Conference of Indian Pharmacological Society (IPSCON-2009) Kolkata December 10-12, 2009
60.	Dr Kavita Gulati	Possible role of nitrosative stress in drug and xenobiotic induced toxicity	Society for Free Radical Research (SFRR)	International Conference on Advances in Free Radical Research and 9th Annual Conference of the Society for Free Radical Research (SFRR) Hyderabad January 11-13, 2010
61.	Dr Kavita Gulati	Recent trends in clinical trials: a herbal experience	ITM Universe and DRDE, (DRDO)	National Seminar on Biotechnology and Health Gwalior March 19-20, 2010
62.	Dr Ritu Kulshrestha	Environmental lung disease-the Indian scenario	Kerala Chapter of Indian Association of Pathologists & Microbiologists	6th Asia Pacific International Academy of Pathology (IAP) Congress Kochi, Kerala August 20-23, 2009
63.	Dr Ritu Kulshrestha	Analysis of bronchoalveolar lavage fluid in neoplastic and nonneoplastic lung lesions	Indian Association for Bronchology	15th Annual Conference of the Indian Association for Bronchology Agra February 5-7, 2010

Conferences/Symposia/Seminars/Workshops/CMEs

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
1.	Dr V.K. Vijayan	Organising Chairman	V.P.C.I. University of Delhi	National Seminar on "Environmental Lung Diseases" on the occasion of the foundation day of the Vallabhbhai Patel Chest Institute Delhi April 6, 2009
2.	Dr V.K. Vijayan	Chaired a session on Lung cancer	Indian Society for Study of Lung Cancer	3rd Biennial Conference of the Indian Society for Study of Lung Cancer Hotel Peterhoff, Shimla April 25, 2009
3.	Dr V.K. Vijayan	Chaired session on Pulmonary vascular diseases	American College of Chest Physicians, West India Chapter	American College of Chest Physicians, West India Chapter Delhi June 21, 2009
4.	Dr V.K. Vijayan	Participated as an Expert	Indian Council of Medical Research (ICMR), the United States Centres for Disease Control & Prevention (USCDC), National Centre for Environmental Health (NCEH) and the University of Michigan Centre for Global Health (UMCGH)	Joint Indo-US Workshop on Climate Change and Health (India Co-Chair of Scientific Session) Goa August 30-September 2, 2009
5.	Dr V.K. Vijayan	Judge, for evaluating the best paper presentation at "UCB-ICAAI Young Scientist Award Session Course Director, Workshop on Pulmonary function tests	Government Medical College	43rd Annual Conference of the Indian College of Allergy, Asthma and Applied Immunology (ICAAICON 2009) Chandigarh October 1-4, 2009

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
6.	Dr V.K. Vijayan	Member, Panel Discussion on The big chat on CAD: current concepts	Association of Physicians, Bhopal	7th National Conference on Cardiology, Diabetology, Electrocardiology, Echocardiology & Critical Care Hotel Jehan Numa Palace Shamla Hills Bhopal October 3-4, 2009
7.	Dr V.K. Vijayan	Session Co-ordinator for a Technical Session at the	Ministry of Health and Family Welfare, Government of India, Ministry of Environment and Forests, Government of India and the United Nations Environment Programme (UNEP)	Workshop on Phase-out of CFCs (Chloroflurocarbons) in metered-dose inhalers (MDIs) Transition Strategy Implementation and Adoption of CFC-free Alternatives in India AIIMS, New Delhi October 5, 2009
8.	Dr V.K. Vijayan	Judge, for selecting the best free paper poster Chaired a session on Interventional pulmonology	Bangladesh Lung Foundation and the Bangladesh Society of Allergy & Immunology (BANSAI)	Congress on Total Lung Health Bangabandhu International Conference CentreDhaka, Bangladesh October 14-15, 2009
9.	Dr V.K. Vijayan	Member, Advisory Committee	V.P.C.I. University of Delhi and Indian Council of Medical Research	Symposium on Research on Bhopal Gas Tragedy and organised a meeting to commemorate "25 years of Bhopal Gas Disorder" Delhi December 3, 2009
10.	Dr V.K. Vijayan	Participated as a representative of World Lung Foundation	International Union Against Tuberculosis and Lung Disease (The Union)	40th Union World Conference on Lung Health Cancún, Mexico December 3-7, 2009

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
11.	Dr V.K. Vijayan	Chaired a session on Nanotechnology	Centre for Occupational and Environmental Health, Maulana Azad Medical College and Collegium Ramazzini and Drexel University Scholl of Public Health, Philadelphia	International Conference on Preventing Emerging Occupational and Environmental Risks in South Asia and Beyond New Delhi December 17-19, 2009
12.	Dr V.K. Vijayan	Lecture on: Bronchial asthma: patophysiology	Santosh Medical University	CME on Bronchial Asthma Ghaziabad December 19, 2009
13.	Dr V.K. Vijayan	Chair, Indian Team, Asthma, Allergy & Immunology	American Association of Physicians of Indian Origin and Indian Medical Association	3rd Indo-US Health Care Summit and 1st Global Health Care Summit ITC Maurya Sheraton, New Delhi January 2-3, 2010
14.	Dr V.K. Vijayan	Lecture on: Difficult asthma	Association of Physicians of India	65th Annual Conference of Association of Physicians of India (APICON 2010) Jaipur January 7-10, 2010
15.	Dr V.K. Vijayan	Participated in a panel discussion on Bronchoalveolar lavage	Indian Association for Bronchology	15th Annual Conference of the Indian Association for Bronchology Agra February 5-7, 2010
16.	Dr V.K. Vijayan	Organising Chairman Chaired a session on Seminar on pneumonia	V.P.C.I. University of Delhi	Seminar on Pneumonia: 9th CME Delhi February 13, 2010
17.	Dr V.K. Vijayan	Organising Chairman Lecture on: Difficult asthma	V.P.C.I. University of Delhi and Institute of Genomics and Integrative Biology	35th Workshop on Respiratory Allergy: Diagnosis and Management Delhi March 8-12, 2010

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
18.	Prof. S.N. Gaur	Lecture on: Immunotherapy is an evidence based intervention for asthma – WHO - How strong is the evidence? In theWorkshop on Allergy esting and immunotherapy Participated in a panel discussion onInterective session on Immunotherapy Chaired sessions on • Asthma: epidemiology and pathophysiology • Allergy and immunotherapy	Government Medical College	43rd Annual Conference of the Indian College of Allergy, Asthma and Applied Immunology (ICAAICON 2009) Chandigarh October 1-4, 2009
19.	Prof. S.N. Gaur	National Advisor Lecture on: Sublingual immunotherapy, CME on Allergen immunotherapy	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2009) Calicut November 5-8, 2009
20.	Prof. S.N. Gaur	Chaired a session on Allergy and immunotherapy	American Association of Physicians of Indian Origin and Indian Medical Association	3rd Indo-US Health Care Summit and 1st Global Health Care Summit New Delhi January 2-3, 2010
21.	Prof. S.N. Gaur	Lecture on: Overview of immunotherapy; present scenario in the CME on Update on allergy and asthma Participated in a panel discussion onInterective session on Immunotherapy	Indian Association for Bronchology	15th Annual Conference of the Indian Association for Bronchology Agra February 5-7, 2010
22.	Prof. A. Ray	Lecture on: Nitric oxide: a target molecule for drug develoment	Maharaja Surajmal Institute of Pharmacy, G.G.I.P. University	Workshop-cum-training Programme on Pharmacy in New Millennium – Opportunities and Challenges New Delhi July 20-30, 2009

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
23.	Prof. A. Ray	Presented a poster on Stress-induced anxiogenesis and brain oxidative injury in rats:influence of age, sex and emotionality	International Society for Cerebral Blood Flow and Metabolism	24th International Symposium on Cerebral Blood Flow, Metabolism and Function, Chicago, IL, USA June 29 - July 3, 2009
24.	Prof. A. Ray	Member, National Advisory Committee Chaired a session on Advances in respiratory pharmacology and therapeutics	Indian Pharmacological Society	International Conference on Integrative and Personalized Medicine and 42 Annual Conference of Indian Pharmacological Society (IPSCON-2009) Kolkata December 10-12, 2009
25.	Prof. A. Ray	Participated as VPCI nominee	Ministry of Environment and Forests, Government of India	National Conference of the Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA) New Delhi January 15, 2010
26.	Prof. Mridula Bose	Lecture on: Tissue culture techniques	UGC-CSIR	Workshop on Animal, Plant and Bacterial Culture Systems Miranda House, University of Delhi, Delhi July 9, 2009
27.	Prof. Mridula Bose	Presented apaper on Comparative expression profile of *fadD*5 and intergenic region in *mce1* operon in *M. tuberculosis* and *M. smegmatis*	Institute of Microbial Technology (IMTECH)	International Conference on Understanding and Managing Pathogenic Microbes Chandigarh January 22-24, 2010
28.	Prof. Mridula Bose	Lecture on: Multi-drug resistance tuberculosis – laboratory diagnosis	R.B.T.B. Hospital	CME on Update in Tuberculosis Diagnosis and Management Delhi February 9, 2010

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
29.	Prof. Mridula Bose	Chaired a session on Free paper presentation –young scientist competition	Indian Association of Medical Microbiologists	Second Annual Conference "Future of Microbiology", MICROCON New Delhi March 12-13, 2010
30.	Prof. Ashok Shah	Chaired a session on Air pollution and health in India and respiratoryconsequences of Bhopal disaster	V.P.C.I. University of Delhi	National Seminar on "Environmental Lung Diseases" on the occasion of the foundation day of the Vallabhbhai Patel Chest Institute Delhi April 6, 2009
31.	Prof. Ashok Shah	Chaired a workshop on Diagnosis and management of asthma	European Academy of Allergology and Clinical Immunology	XXVIII Congress of the European Academy of Allergology and Clinical Immunology (EAACI) Warsaw, Poland June 6-10, 2009
32.	Prof. Ashok Shah	Lecture on: Allergic inflammation, asthma, rhinitis and sinusitis	Indian Academy of Pediatrics Alwar District Branch	CME of the Indian Academy of Pediatrics Alwar District Branch Hotel Clarks Inn, Alwar, Rajasthan August 22, 2009
33.	Prof. Ashok Shah	Lecture on: Asthma - yesterday, today and tomorrow	Chest Dept, Medical College	CME of the Chest Dept, Medical College Kolkata September 19, 2009
34.	Prof. Ashok Shah	Chaired a session on Aeroallergens	Government Medical College	43rd Annual Conference of the Indian College of Allergy, Asthma and Applied Immunology (ICAAICON 2009) Chandigarh October 1-4, 2009
35.	Prof. Ashok Shah	Chaired a session on PFT - How do we interpret it now?	Department of Academics & Health Research, AMRI Hospitals	National Conference on Recent Advances in Medical Specialties, AMRICON 2009 Science City Auditorium, Kolkata October 10-11, 2009

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
36.	Prof. Ashok Shah	Chaired a session on Immunology and genetics in sarcoidosis	Yugoslav Association of Sarcoidosis	IX Assembly of the Yugoslav Association of Sarcoidosis, International Conference on Multisystem Sarcoidosis Belgrade, Serbia October 15-16, 2009
37.	Prof. Ashok Shah	Lecture on: Allergic bronchopulmonary aspergillosis	V.P.C.I. University of Delhi and Institute of Genomics and Integrative Biology	35th Workshop on Respiratory Allergy: Diagnosis and Management Delhi March 8-12, 2010
38.	Prof. Ashok Shah	Chaired sessions on • Symposium on COPD • Free paper sessions	Department of Pulmonary Medicine, Geetanjali Medical College and Hospital (GMCH) and Rajasthan Chapter of National College of Chest Physicians India	9th Annual Conference of the Rajasthan Chapter of National College of Chest Physicians India (NCCP RAJCON 2010) Udaipur March 13-14, 2010
39.	Prof. S.K. Chhabra	Lecture on: Sick building syndrome	V.P.C.I. University of Delhi	National Seminar on "Environmental Lung Diseases" on the occasion of the foundation day of the Vallabhbhai Patel Chest Institute Delhi April 6, 2009
40.	Prof. S.K. Chhabra	Adverse effects of air pollution	Centre for Science and Environment	Workshop on Clean Air Imperatives and Urban Mobility New Delhi September 2, 2009

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
41.	Prof. S.K. Chhabra	Lectures on: • Spirometry: patient preparation and indications in the workshop on Pulmonary functions tests· • Management of asthma and assessment control	Government Medical College	43rd Annual Conference of the Indian College of Allergy, Asthma and Applied Immunology (ICAAICON 2009) Chandigarh October 1-4, 2009
42.	Prof. S.K. Chhabra	Lectures on: • Spirometry: basicsand indications tests • Lung volumes: terminology Delivered in the Workshop on Pulmonary functions tests	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2009) Calicut November 5-8, 2009
43.	Prof. S.K. Chhabra	Lecture on: Adverse effects of Air Pollution: review and Indian scenario	Thapar University	Workshop on Health Effects of Particulate Air Pollution Patiala November 26-27, 2009
44.	Prof. S.K. Chhabra	Chaired asession on Analysis and clinical application of ABG	Maulana Azad Medical College	Medicine Update 2009 New Delhi December 21-23, 2009
45.	Prof. S.K. Chhabra	Chaired a pane discussion on COPD	Tuberculosis Association of India	64th National Conferences on Tuberculosis and Chest Diseases Kolkata December 27-29, 2009
46.	Prof. S.K. Chhabra	Lecture on: Hospital acquired pneumonia	V.P.C.I. University of Delhi	Seminar on Pneumonia – 9th CME Delhi February 13, 2010
47.	Prof. S.K. Chhabra	Lecture on: Control of bronchial asthma Practical demonstrations on Pulmonary function tests	V.P.C.I. University of Delhi and Institute of Genomics and Integrative Biology	35th Workshop on Respiratory Allergy: Diagnosis and Management Delhi March 8-12, 2010

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
48.	Prof. Raj Kumar	Organising Secretary	V.P.C.I. University of Delhi	National Seminar on "Environmental Lung Diseases" on the occasion of the foundation day of the Vallabhbhai Patel Chest Institute DelhiApril 6, 2009
49.	Prof. Raj Kumar	Lecture on: Setting up of cessation facility Participated in a panel discussion on Integrated strategies of National Cancer Control Programme and National Tobacco Control Programme for prevention and control of cancer	Directorate General of Health Services, Govt. of India	Workshop on Tobacco and Cancer Vigyan Bhawan New Delhi May 18, 2009
50.	Prof. Raj Kumar	Organising Secretary	V.P.C.I. University of Delhi	National Review Meeting of Tobacco Cessation Centers Delhi October 28-29, 2009
51.	Prof. Raj Kumar	Organising Secretary	V.P.C.I. University of Delhi	National Consultation to Develop Guidelines for Tobacco Cessation Delhi October 29-30, 2009
52.	Prof. Raj Kumar	Lectures on: • Aero allergens • Skin test pitfalls	National Allergy Asthma Bronchitis Institute	Allergy and Skin Prick Testing Workshop Kolkata December 13, 2009
53.	Prof. Raj Kumar	Organising Secretary	V.P.C.I. University of Delhi	Seminar on Pneumonia – 9th CME Delhi February 23, 2010
54.	Prof. Raj Kumar	Organising Secretary Lecture on: Food allergy in bronchial asthma Practical demonstrations on Skin testing	V.P.C.I. University of Delhi and Institute of Genomics and Integrative Biology	35th Workshop on Respiratory Allergy: Diagnosis and Management Delhi March 8-12, 2010

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
55.	Dr Balakrishnan Menon	Presented a paper on Evaluation of oxidant-antioxidant status in different stages of COPD: determination of serum paraoxonase1 and malonyldialdehyde levels	Europeon Respiratory Society	19th Europeon Respiratory Society Annual Congress (ERS-2009) Vienna, Austria September 12-16, 2009
56.	Dr Balakrishnan Menon	Lecture on: DOTS plus guidelines	Babu JagjivanRam Hospital	CME on DOTS and DOTS Plus New Delhi March 5, 2010
57.	Dr Balakrishnan Menon	Lecture on: Pharmacology of asthma	V.P.C.I. University of Delhi and Institute of Genomics and Integrative Biology	35th Workshop on Respiratory Allergy: Diagnosis and Management Delhi March 8-12, 2010
58.	Dr Mandira Varma	Presented a paper on Rapid identification of *M. tuberculosis* by PCR restriction analysis directly in clinical samples	International Union Against Tuberculosis and Lung Diseases	5th Congress of the International Union Against Tuberculosis and Lung Diseases Dubrovnik, Croatia May 27-30, 2009
59.	Dr Mandira Varma	Lecture on: Bacterial culture systems	UGC-CSIR	Workshop on Animal, Plant and Bacterial Culture Systems Miranda House, University of Delhi, Delhi July 9, 2009
60.	Dr Anuradha Chowdhary	Lecture on: Fungal pneumonia	V.P.C.I. University of Delhi	Seminar on Pneumonia – 9th CME Delhi February 13, 2010

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
61.	Dr Anuradha Chowdhary	Presented papers on • Prevalence of fungal rhinosinusitis in Delhi / New Delhi metropolitan area- a mycoserologic, histopathologic and clinical study • First report of *Candida nivariensis* pneumonia in a HIV infected patient in India • Rhinofacial entomophthoromycosis due to *Conidiobolus coronatus*- a case report from north India and an overview	International Society for Human and Animal Mycology (ISHAM)	17th Congress of the International Society for Human and Animal Mycology (ISHAM) Tokyo, Japan May 25-29, 2009
62.	Dr Anuradha Chowdhary	Presenteda paper on Molecular ecology and antifungal susceptibility of *Cryptococcus neoformans* and *C. gattii* in India	Indian Association of Medical Microbiologists (IAMM) and J.S.S. Medical College	XXXII Annual Congress of Indian Association of Medical Microbiologists (IAMM) Mysore November 2-7, 2009
63.	Dr Anuradha Chowdhary	Presented papers on • Allergic bronchopulmonary mycosis due to *Bipolaris hawaiiensis* - a rare case in a pediatric patient from Delhi • Cryptococcal meningitis in a tertiary care hospital: a study of antifungal susceptibility testing a molecular types	Society for Indian Human and Animal Mycologists (SIHAM 2010)	VIII National Conference of Society for Indian Human and Animal Mycologists (SIHAM 2010) AIIMS, New Delhi March 4-6, 2010
64.	Dr Madhu Khanna	Presented papers on A combinatorial antiviral approach against influenza A virus using ribozyme and siRNA	European Scientific Working Group on Influenza	Third Ditan International Conference On Infectious Disease Beijing International Convention Centre, Beijing, China July 30- August 2, 2009

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
65.	Dr Anita Kotwani	Presented papers on • Assessing asthma management in an urban community in Delhi, India • Does add-on evening dose of formoterol improve lung function for COPD patients receiving fixed-dose of tiotrpium and formoterol?	AInternational Society for Pharmacoeconomics and Outcome Research (ISPOR)	Annual International Conference of ISPOR Florida, USA May 16-20, 2009
66.	Dr Anita Kotwani	Chaired a session on Antibiotic resistance in India: current status and avenues for policy change	Global Antibiotic Resistance Partnership (GARP-India)	Global Antibiotic Resistance Partnership (GARP-India) New Delhi August 24-25, 2009
67.	Dr Anita Kotwani	Chaired asession on Misuse of antibiotics	India International Centre	Prevention of Ill Health New Delhi September 20, 2009
68.	Dr Anita Kotwani	Presented a research work on Community basedsurveillance of antimicrobial use in resource-constrained settings	Pharmaceutical Policy Research Fellowship and Drug Policy Research Group, Department of Population Medicine	Pharmaceutical Policy Research Seminar Harvard Medical School, Boston, USA October 7, 2009
69.	Dr Anita Kotwani	Participated in a discussion on Medical supply chain in India	MIT-Zaragoza International Logis HCPregeam	2nd Global Health Spply Chain Summit Zaragoza, Spain December 2-4, 2009
70.	Dr Anita Kotwani	Expert Member Lecture on: Community-based surveillance of antimicrobial drugs: method and results from Delhi	National Centre for Disease Control, Ministry of Health and Family Welfare, Government of India	Workshop on "Antimicrobial Resistance" during Indo-Swedish Health Week New Delhi January 31-February 5, 2010

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
71.	Dr Kavita Gulati	Presented posters on • Role of oxidative and nitrosative stress during theophylline induced seizures in experimental animals • Stress induced anxiogenesis and brain oxidative injury in rats: Influence of age, sex and emotionality	International Society for Cerebral Blood Flow and Metabolism	24th International Symposium on Cerebral Blood Flow, Metabolism and Function, Chicago, IL, USA June 29 - July 3, 2009
72.	Dr Kavita Gulati	Lecture on: Clinical trials and their regulatory issues	Maharaja Surajmal Institute of Pharmacy, G.G.I.P. University	Workshop-cum-Training Programme on Pharmacy in New Millennium – Opportunities and Challenges New Delhi July 20-30, 2009
73.	Dr Kavita Gulati	Chaired a session on Autocoids	Indian Pharmacological Society	International Conference on Integrative and Personalized Medicine and 42 Annual Conference of Indian Pharmacological Society (IPSCON-2009) Kolkata December 10-12, 2009
74.	Dr Vishal Bansal	Presented a poster on Effects of 17-βestrdiol on haemodynamic parameters in coronary artery blockade model of rabbit	Department of Physiology, University College of Science & Technology, University of Calcutta	International Conference on Integrative Physiology: Modern Perspective & Platinum Jubilee Celebrations of the Physiological Society of India Science City Convention Centre, Kolkata November 12-14, 2009
75.	Dr Ritu Kulshrestha	Joint Organising Secretary	V.P.C.I. University of Delhi	National Seminar on "Environmental Lung Diseases" on the occasion of the foundation day of the Vallabhbhai Patel Chest Institute Delhi April 6, 2009

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
76.	Dr Ritu Kulshrestha	Presented a paper on Haematological and coagulation profiles in acute exacerbations of COPD	Indian Association of Pathologists and Microbiologists (IAPM)	24th Annual Conference-Delhi Chapter, IAPM, U.C.M.S & G.T.B. Hospital Delhi April 11, 2009
77.	Dr Ritu Kulshrestha	Presented a paper on Localised dystrophic ossification in mixed dust pneumoconiosis	Kerala Chapter of Indian Association of Pathologists & Microbiologists	6th Asia Pacific International Academy of Pathology (IAP) Congress Kochi, Kerala August 20-23, 2009
78.	Dr Ritu Kulshrestha	Participated in a panel discussion on bronchoalveolar lavage	Indian Association for Bronchology	15th Annual Conference of the Indian Association for Bronchology Agra February 5-7, 2010
79.	Dr Ritu Kulshrestha	Chaired a session on Occupational lung diseases	Post Graduate Institute of Medical Education and Research	International Pathology Update Chandigarh February 19-21, 2010
80.	Dr Nikhil Modi (MD Student) *(Guide: Prof. Ashok Shah)*	Presented a paper on Assessment of disease severity in patients with allergic rhinitis when categorised as "sneezers and runners" and ' blockers'	Asian Pacific Society of Respirology and the American College of Chest Physicians, and the Korean Academy of Tuberculosis and Respiratory Diseases	14th Congress of the Asian Pacific Society of Respirology and 3rd Joint Congress of the Asian Pacific Society of Respirology and the American College of Chest Physicians, hosted by the Korean Academy of Tuberculosis and Respiratory Diseases Seoul, Korea November 14-18, 2009
81.	Dr Shweta Bansal (MD Student) *(Guide: Dr V.K. Vijayan)*	Eosinophilic lung disease presenting as an opaque haemithorax	Government Medical College	43rd Annual Conference of the Indian College of Allergy, Asthma and Applied Immunology (ICAAICON 2009) Chandigarh October 1-4, 2009

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
82.	Mr Anil Singh Baghel (PhD Student) *(Guide: Prof. H.G. Raj)*	Presented a poster on Establishment of glutamine synthetase of *M. tuberculosis* as a protein acetyltransferase utilising polyphenolic acetates as the acetyl group donors : possible role in *Mtb* Inhibition	Department of Chemistry, University of Delhi	International Symposium on Trends in Drug Discovery and Development Delhi January 5-8, 2010
83.	Ms Ruchi Bhagat (Physiology) *(Guide: Prof. K. Ravi)*	Presented a paper on High altitude exposure (HAE), calcitonin gene related peptide (CGRP) and rapidly adapting receptor (RAR) activity	NIMS University and Indian Academy of Neurosciences	XXVII Annual Conference of Indian Academy of Neurosciences Jaipur December 18-20,2009

Participation in Advanced and Specialised Training Programme by Faculty Members

Sl No.	Participant (Department)	Course Title/ Topic	Training Duration	Host
1.	Dr Mujeeb-ur-Rahman (Biostatistics)	Training Programme on Statistical Package for Social Sciences	October 26-30, 2009	Delhi University Computer Center, Delhi
2.	Dr Vishwajeet Rohil (Clinical Biochemistry)	Molecular Biology Techniques in Cancer Diagnosis and Treatment	March 26-28, 2010	Rajiv Gandhi Cancer Institute and Research Centre, New Delhi
3.	Dr Anuradha Chowdhary (Medical Mycology)	Advanced Laboratory Training Course: Molecular medical Mycology	November 22-29, 2009	The University of Melbourne, Australia and Mahidol University, Thailand in collaboration with Howard Hughes Medical Institute, USA, Bangkok, Thailand
4.	Dr Ritu Kulshrestha (Pathology)	Advanced Course on Confocal Microscopy and Imaging	November 23-24, 2009	International Centre for Genetic Engineering and Biotechnology (ICGEB), New Delhi
5.	Prof. A. Ray (Pharmacology)	Training Programme on Statistical Package for Social Sciences	September 7-11, 2009	Delhi University Computer Center, Delhi
6.	Dr Kavita Gulati (Pharmacology)	Training Programme on Statistical Package for Social Sciences	September 7-11, 2009	Delhi University Computer Center, Delhi

Short-Term Specialised Trainings Imparted by Faculty Members

Sl No.	Name, Subject and Organisation	Course Title/Topic	Faculty Member (Department)	Period
1.	Ms Priyamvada Sharma BTech, (Biotechnology) C.I.I.M., N.I.T., Faridabad, Haryana	Techniques in biochemistry	Prof. S.K. Bansal (Biochemistry)	June 1 – July 15, 2009
2.	Ms Niharika Sharma BTech, (Biotechnology) Amity Univerity, Noida, U.P.	Techniques in biochemistry	Prof. S.K. Bansal (Biochemistry)	June 1 – June 30, 2009
3.	Ms Ashima Jain BSc (H), (Biomedical Sciences) Bhaskaracharya College of Applied Sciences, University of Delhi, Delhi	DNA cloning	Prof. Mridula Bose (Microbiology)	May 1 – June 30, 2009
4.	Ms Sikha Sharma BSc (H), (Biomedical Sciences) Bhaskaracharya College of Applied Sciences, University of Delhi, Delhi	DNA cloning	Prof. Mridula Bose (Microbiology)	May 1 – June 30, 2009
5.	Mr Vikrant Rajput BTech, (Biotechnology) Amity University Noida, Uttar Pradesh	Recombinat DNA techniques	Prof. Mridula Bose (Microbiology)	June 1 – June 30, 2009
6.	Ms Sonia MSc (Genetics) University of Delhi, South Campus, New Delhi	Protein purification (Microbiology)	Prof. Mridula Bose	May 25 – July 10, 2009
7.	Ms Kirti Kajal MSc (Biomedical Sciences) B.R. Ambedkar Center for Biomedical Sciences, University of Delhi, Delhi	Purificatio of *mce4A* protein of *M. tuberculosis*	Prof. Mridula Bose (Microbiology)	June 1 – July 16, 2009

Sl No.	Name, Subject and Organisation	Course Title/Topic	Faculty Member (Department)	Period
8.	Ms Manpreet Kaur MSc (Biomedical Sciences) B.R. Ambedkar Center for Biomedical Sciences, University of Delhi, Delhi	Purificatio of *mce1A* protein of *M. tuberculosis*	Prof. Mridula Bose (Microbiology)	June 1 – July 16, 2009
9.	Ms Shalini Sharma BSc (Microbiology) Shaheed Rajguru College of Applied Sciences for Women, University of Delhi, Delhi	Cloning and expression of *lspA* gene	Prof. Mridula Bose (Microbiology)	June 10 – July 9, 2009
10.	Mr Niladri Banerjee BTech, (Biotechnology) Amity University, Noida, Uttar Pradesh	Molecular diagnosis of pulmonary tuberculosis	Dr Mandira Varma (Microbiology)	July 1 – July 31, 2009

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.

Institute celebrated the Independence Day function on 15th August 2009.

List of Publications

1. Anand A, Roy A, Bhargava B, Raj H, Barde PB, Vijayan VK. Early symptom-relief after valvulotomy in mitral stenosis indicates role of lobeline-sensitive intrapulmonary receptors. *Respir Physiol Neurobiol* 2009;169:297-302.

2. Chhabra SK, Gupta AK, Khuma MZ. Evaluation of three scales of dyspnea in chronic obstructive pulmonary disease. *Ann Thorac Med* 2009;4:128-32.

3. Chhabra SK. Pulmonary hypertension associated with chronic obstructive pulmonary disease. *Indian J Chest Dis Allied Sci* 2010;52: 29-40.

4. Chowdhary Anuradha, Randhawa HS, Khan ZU, Ahmad S, Juneja S, Sharma B, Roy P, Sundar G, Joseph L. First isolations in India of *Candida nivariensis*, a globally emerging opportunistic pathogen. *Med Mycol* 2010;48:416-20.

5. Gaur SN, Singh BP, Singh AB, Vijayan VK, Agarwal MK. Guidelines for practice of allergen immunotherapy in India. *Indian J Allergy Asthma Immunol* 2009;23:1-21.

6. Gulati Kavita, Ray A, Vijayan VK. Assessment of protective role of polyherbal preparation, Livina, against anti-tubercular drug induced liver dysfunction. *Indian J Exp Biol* 2010;48:318-22.

7. Gupta S, Sharma SB, Bansal SK, Prabhu KM. Antihyperglycemic and hypolipidemic activity of aqueous extract of *Cassia auriculata* L. leaves in experimental diabetes. *J Ethnopharmacology* 2009;123:499–503.

8. Gupta S, Sharma SB, Prabhu KM, Bansal SK. Protective role of *Cassia auriculata* leaf extract on hyperglycemia-induced oxidative stress and its safety evaluation. *Indian J Biochem Biophys* 2009;46:371-7.

9. Joon Monika, Bhatia Shipra, Pasricha Rashmi, Bose Mridula, Vani Brahmachari. Functional analysis of an intergenic non-coding sequence within *mce1* operon of *M. tuberculosis*. *BMC Microbiology* 2010;10:128-33.

10. Khanna Madhu, Gupta N. Influenza A (H1N1) pandemic: preparedness and clinical management. *Indian J Exp Biol* 2009;47:843-932.

11. Khanna Madhu, Gupta N, Gupta A, Vijayan V.K. Influenza A (H1N1) 2009: a pandemic alarm. *J Biosci* 2009;34:481-9.

12. Khanna Madhu, Kumar B, Gupta N, Kumar P, Gupta A, Vijayan VK, Kaur H. Pandemic swine influenza virus (H1N1): a threatening evolution. *Indian J Microbiol* 2009;49:365-9.

13. Kotwani A. Antimicrobial drug use surveillance, Delhi, India. In: Community-based surveillance of antimicrobial use and resistance in resource-constrained settings. Report on five pilot projects. World Health Organization, WHO Press, Geneva, 2009;17-26.

14. Kotwani A. Availability, price, and affordability of asthma medicines in five Indian states. *Intl J Tuber Lung Dis* 2009;13:574-9.

15. Kotwani A, Gurbani N, Sharma S, Chaudhury R. Insights for policymakers from a medicine price survey in Rajasthan. *Indian J Med Res* 2009;129:451-4.

16. Kotwani A, Holloway K, Roy Chaudhury R. Methodology for surveillance of antimicrobials use among out-patient in Delhi. *Indian J Med Res* 2009;129:555-60.

17. Kukreja N, Sridhara S, Singh BP, Gaur SN, Arora N. Purification and immunological characterization of a 12-kDa allergen from *Epicoccum purpurascens*. *FEMS Immunol Med Microbiol* 2009;56:32-40.

18. Kumar R, Prakash S, Kushwah AS, Vijayan VK. Breath carbon monoxide concentration in cigarette and *bidi* smokers in Indian. *Indian J Chest Dis Allied Sci* 2010;52:19-24.

19. Kumari Ranju, Bansal Seema, Gupta Garima, Arora Shvetambri, Kumar A, Goel S, Singh P, Ponnan Prija, Priya Nivedita, Tyagi TK, Baghel AS, Manral Sushma, Tandon Rashmi, Joshi Rini, Rohil V, Gaspari M, Kohli Ekta, Tyagi YK, Dwarakanath BS, Saluja Daman, Chatterji Suvro, Sharma SK, Prasad AK, Rastogi RC, Raj HG, Parmar VS. Calreticulin transacylase: genesis, mechanism of action and biological applications. *Biochimie* (2010) (Epub ahead of print) [doi:10.1016/j.biochi.2010.01.016].

20. Mehta AK, Arora N, Gaur SN, Singh BP. Acute toxicity assessment of choline by inhalation, intraperitoneal and oral route in Balb/c mice. *Regul Toxicol Pharmacol* 2009;54:282-6.

21. Mehta AK, Arora N, Gaur SN, Singh BP. Choline supplementation reduces oxidative stress in mouse model of allergic airway disease. *Eur J Clin Invest* 2009;39: 934-41.

22. Mehta AK, Singh BP, Arora N, Gaur SN. Choline attenuates immune inflammation and suppresses oxidative stress in patients with asthma. Immunobiology 2009 [Epub 2009 Nov 6, PMID 19897276].

23. Panjabi C, Sahay S, Shah A. Aspergilloma formation in cavitating sarcoidosis. *J Bras Pneumol* 2009;35:480-483.

24. Priya Nivedita, Gupta Anjali, Chand K, Singh P, Kathuria Abha, Raj HG, Parmar VS, Sharma SK. Characterization of 4-methyl-2-oxo-1,2-dihydroquinolin-6-yl acetate as aneffective antiplatelet agent. *Bioorganic Medicinal Chemistry* (2010) [doi:10.1016/j.bmc.2010.04.011].

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