2017-18 ANNUAL REPORT

Vallabhbhai Patel Chest Institute

Annual Report 2017-18

Vallabhbhai Patel Chest Institute
University of Delhi, Delhi, India

Environment day was celebrated on June 5, 2017. Prof. A. Ray, Director (Acting) was planting a sapling with staff of the Institute

3rd International Yoga Day was observed on June 21, 2017. Sh. Manoj Kumar, Yoga Trainer at our Institute performing on the occasion and teaches some simple yoga exercises to participants for their good health and fitness

Swachhata Abhiyan was celebrated from September 15 to October 5, 2012. Participants were taking a Swachhata pledge with Prof. A. Ray, Director (Acting). Sh. P.R. Santhanam, Joint Registrar addressed the audience on this occasion

Constitution Day was observed on November 26, 2017. Prof. Raj Kumar, Director (Acting) with some of the employees of the Institute on the occasion

ANNUAL REPORT
2017-18

Vallabhbhai Patel Chest Institute
University of Delhi, Delhi, India

Published by

Professor Raj Kumar, Director (Acting), Vallabhbhai Patel Chest Institute, University of Delhi, Delhi-110 007; Phone: 27402435, 27667102, 27667441, 27667667, 27666182.

Compiled and Edited by

Publication Division, VPCI.

Cover Design by

Photography Division, VPCI.

Printed at

Indian Offset Press, Phase-I, Maya Puri, New Delhi (Phone: 011-28116494, 28115486).

This Annual Report can be accessed at website: www.vpci.org.in

From the Director's Desk

It is my proud privilege to present the Institute's Annual Report for the year 2017-18. The report provides an overview of the activities and achievements of the Institute in the areas of post-graduate medical education, research and patient care with the support of the University of Delhi and Ministry of Health and Family Welfare, Government of India, the Institute has been able to strive and thrive to achieve its objectives to the cause of the society during the year under report.

Main objectives of Vallabhbhai Patel Chest Institute (VPCI) are to conduct research in basic and clinical aspects related to chest diseases, to train post-graduates in Pulmonary and Critical Care Medicine and allied disciplines, to develop new diagnostic technology and disseminate scientific knowledge related to Chest Medicine to other institutions in the country and, over and above all, to provide specialised patient care services to patients from India as well as other countries of the Asia. As on date, the Institute has made tremendous development in respect to research activities, imparted training to many students and fulfills the national need for providing relief to large number of patients in the community suffering from chest diseases.

The Institute undertakes training of students pursuing DM (Pulmonary Medicine) and MD in Pulmonary Medicine, Microbiology, Biochemistry, Physiology and Pharmacology. In addition, VPCI also has the privilege of training PhD students in various subjects. A large number of physicians, paramedical staff and students from other Universities/Institutions/Colleges were trained in various departments of the Institute during the year.

Research in both basic and clinical sciences is one of the major objectives of the Institute. We have 40 research projects funded by various Government Departments like ICMR, DST, DBT, CSIR and Ayush amounting to funds over 14 crores in the Institute at present. The research contributions from the Institute are widely acclaimed. The vibrancy of these research projects/activities can be well judged from the list of publications in peer/reviewed journals, orations, guest lectures delivered and papers presented in the International and National conferences by the faculty members and students of the Institute. The faculty members also received several Awards and Honours in their field of specialisation. The details of work done under the various ongoing research projects, awards and honours received by the faculty members and publications during the year have been presented in this report. The Institute organised several conferences and workshops where eminent experts from all over the world participated and shared their experiences. As in the previous years, the well-known Prof. Raman Viswanathan-VPCI and Prof. A.S. Paintal Memorial orations were delivered during the year. The Institute started oration in the honour of Dr V.K. Vijayan and Prof. H.S. Rand hawa in the year 2015. The research laboratories are being equipped with the latest technology to keep pace with the rest of the world. A centralised Multidisciplinary Research Unit (MRU) has been started, fully funded by the Government of India.

The Viswanathan Chest Hospital (VCH), the clinical wing of the Institute, is a tertiary care Chest Hospital with state-of-the-art patient-care facilities. It continues to provide excellent diagnostic and treatment services including critical care management to patients from Delhi, other parts of the country and neighbouring countries suffering from Respiratory Diseases. It also continues to provide other facilities including pulmonary function studies, skin testing, bronchoscopy, sleep studies, pulmonary rehabilitation and various biochemical, pathological and microbiological investigations. The critical care unit has expanded its facilities with acquisition of more ventilators, replacement of other equipments as necessary and continuous emphasis on better management. Comprehensive cardiopulmonary rehabilitation programme comprising of both educational and training sessions is continuing at Cardio-pulmonary Rehabilitation Clinic at VCH.

The Tobacco Cessation Clinic at VCH, a resource Centre for Tobacco Control is running with an aim to educate people to quit smoking and use of tobacco from all spheres through awareness campaigns, with main focus on college students because most of the tobacco users get into this habit in the initial college years.

National Tobacco Quit Line Services (NTQLS) which was started at VPCI, is a pioneering concept in our country to tackle the growing menace of tobacco addiction in a cost-effective manner. NTQLS has the potential to decrease the economic burden from all tobacco-related diseases in India. It is indeed a milestone in tobacco cessation services without any structured promotional activity, like television commercials, advertising, etc, as it reached to 60000 tobacco users in a short span of one year. The services of NTQLS, accessible on telephone, free of cost, from anywhere and at anytime, may reach to rural India through proper advertisement, motivating illiterate tobacco users or launching of awareness programmes regarding the functioning of NTQLS which is available free of cost.

To educate the general public about the chest diseases and allied problems, their treatment and management, Guest and Public Lectures have been organised by the Research cell of the Institute regularly.

With the aim to disseminate scientific knowledge and latest developments in the field of chest diseases and allied sciences, the Institute continued the publication of its reputed quarterly publication *The Indian Journal of Chest Diseases & Allied Sciences,* in collaboration with the National College of Chest Physicians (India). The journal has wide national and international circulation. Institute also continue to publish its biannual Newsletter.

The Institute continues to expand its patient care and research facilities by increasing the range of investigations and facilities for diagnosis and management. Thrust areas identified for special attention in near-future include lung cancer, pulmonary function testing and critical care, thoracoscopy and interventional bronchology, paediatric pulmonology, stem cell research, pharmacogenomics, mycobacteriology, and anaerobe bacteriology. Research in the major areas especially relevant to the country's needs is a continuous process that will be pursued with the renewed vigour besides continuing educational activities.

Prof. Raj Kumar

ANNUAL REPORT (2017-18)

CONTENTS

		Pages
Milestones of Institute	:	7
Orations		
Prof. R. Viswanathan-VPCI	:	11
Prof. A.S. Paintal Memorial	:	13
Prof. H.S. Randhawa	:	14
Dr V.K. Vijayan	:	14
The Institute	:	15
Objectives	:	15
Administration	:	15
Organisation and Management	:	15
Governing Body	:	16
Standing Finance Committee	:	17
Scientific Advisory Committee	:	18
Human Ethics Committee	:	19
Institutional Animal Ethics Committee	:	20
Organisational Structure	:	21
Viswanathan Chest Hospital	:	23
Multidisciplinary Research Unit	:	29
National Centre of Respiratory Allergy, Asthma and Immunology	:	31
National Tobacco Quitline Services	:	32
E-Hospital Services	:	34
Animal House	:	36
Library	:	37
Publication Division	:	38
Departmental Activities	:	39
Biochemistry	:	39
Biostatistics	:	41
Microbiology	:	42
Pathology	:	50
Pharmacology	:	57
Physiology	:	62
Pulmonary Medicine	:	64

Postgraduate Training and Teaching : 66
MD Degrees (Awarded) : 66
MD Theses (Submitted) : 67
MD Theses (Ongoing) : 68
MD (Ist Year) : 69
DM Theses (Awarded) : 70
PhD Awarded/Submitted : 71
PhD Theses (Ongoing) : 73
Faculty Members Associated as Co-supervisors for MD/ PhD Theses of DU and Other Institutions : 75

Distinguished Visitors : 77

Awards/Honours : 78

Sponsored Research Projects : 81

Fellowships : 84

Conferences/Symposia/Seminars/Workshops/CMEs : 86

Participation in Advanced and Specialised Training Programme by Faculty Members : 99

Short-term Specialised Training Imparted by Faculty Members : 100

Public Lecture Series : 102

Cultural and Sports Activities : 103

List of Publications : 105

MILESTONES OF INSTITUTE

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 lakhs.
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, Government 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 re-named 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, started in March 1947, was re-named 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 the 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 (a PG Student Hostel) 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. VPCI Oration was started.
June 14,	1999	24-hour Respiratory Emergency Services were started.
November 12,	1999	His Excellency, Shri K.R. Narayanan, President of India, received the copy of Compendium of Activities (VPCI) 1949-99.
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 [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 and Family Welfare, Government of India.
November 21,	2001	Tobacco Cessation Clinic was started.
August 14,	2002	A State-of-the-Art Oxygen Plant was installed and started.
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.

	2004	Website of the Institute was started (www.vpci.org.in).
September 24,	2005	Prof. Autar Singh Paintal Memorial Oration was started.
January 10,	2006	An 8-bedded Intensive Care Unit was started.
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 was re-named as "Viswanathan Chest Hospital" in honour of the Founder-Director of the Institute and the Golden Jubilee Auditorium was re-named as "Paintal Memorial Golden Jubilee Auditorium" in honour of the former Director of the Institute by a resolution of the Governing Body.
June 22,	2007	Yoga Therapy and Research Centre [in collaboration with the Morarji Desai National Institute of Yoga (MDNIY), New Delhi], was started.
September 18,	2007	Cardio-pulmonary Rehabilitation Clinic was started.
September 17,	2009	Approval by the University of Delhi to start Superspeciality DM Course in Pulmonary and Critical Care Medicine with an intake of two students per year.
August 3,	2010	Approval by the University of Delhi to start Diploma Course in Allergy and Clinical Immunology in VPCI with an intake of two students per year.
February 12,	2011	National Centre of Respiratory Allergy, Asthma and Immunology was started.
March 15,	2011	Permission from Medical Council of India to start DM (Pulmonary Medicine) course with intake of two students per year from the academic year 2011-12.
November 21,	2012	Prof. Rajendra Prasad joined as the Director of the Institute.
May 7,	2013	DOTS Centre was started.
August 18,	2013	DMA Centenary Institution Award was received from Mrs Sheila Dikshit, the Hon'ble Chief Minister, Government of NCT, Delhi for the "Outstanding Contribution in the Field of Patient Health Care".
August 23,	2013	New Ward (44 beds) was started.
		VPCI Newsletter was started.
September 15,	2014	VPCI Gym was inaugurated.
January 6,	2015	In the memory of Prof. A.S. Paintal, a museum was opened, which was dedicated to Prof. Paintal's life and contributions in the world of science, inspiring young scientist, researchers and academicians.
May 30,	2016	National Tobacco Quit Line service, which functions from V.P. Chest Institute, University of Delhi, Delhi, was inaugurated by Shri J.P. Nadda, Union Minister of Health and Family Welfare, Govt. of India, during the "World No Tobacco Day" programme organized by WHO-India, Ministry of Health and Family Welfare, Govt. of India and the National Heritage City Development and Augmentation Yojana (HRIDAY), at New Delhi.
September 30,	2016	Release of VPCI Postal Envelope by Prof. S.N. Gaur, Director (Acting), VPCI at "Neelambari-2016", a District Level Philately Exhibition organized by Sr. Superintendent of Post Offices, Delhi.

February 20,	2017	VPCI Indoor Games Center was inaugurated.
December 8,	2017	An MOU was signed between Vallabhbhai Patel Chest Institute (VPCI), University of Delhi, Delhi and Department of Allergology, University Hospital, Munster, Germany (UKM) on Teaching and Training; Exchange of Information and Academic Materials and Exchange of Faculty, Research Scholars and Administrative and Other Staff.
January 12,	2018	Patient Education Centre was inaugurated.

Prof. R. Viswanathan-VPCI Oration

1st Oration	April 6, 1999	Prof. N.K. Ganguly, Director-General, Indian Council of Medical Research, New Delhi.
2nd Oration	April 6, 2000	Prof. A.S. Paintal, former Director-General, ICMR and former Director, VPCI.
3rd Oration	April 6, 2001	Dr S. Lakshminarayanan, University of Washington School of Medicine, Washington, Seattle, USA.
4th Oration	April 6, 2002	Dr S. Padmavati, President, All India Heart Foundation and Director, National Heart Institute, New Delhi.
5th Oration	April 7, 2003	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.
6th Oration	April 6, 2004	Prof. H.S. Randhawa, former Director, V.P. Chest Institute, University of Delhi, Delhi.
7th Oration	April 6, 2005	Prof. Naranjan S. Dhalla, Distinguished Professor and Director, Institute of Cardiovascular Sciences, St. Boniface General Hospital and Research Centre, University of Manitoba, Winnipeg, Canada.
8th Oration	April 6, 2006	Prof. C.N. Deivanayagam, Former Medical Superintendent, Hospital for Thoracic Medicine, Chennai.
9th Oration	April 6, 2007	Prof. K.K. Talwar, Director, Postgraduate Institute of Medical Education and Research, Chandigarh.
10th Oration	April 6, 2008	Prof. C.R. Babu, former Pro-Vice-Chancellor, University of Delhi, Delhi.
11th Oration	April 7, 2009	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.
12th Oration	April 6, 2010	Prof. M.K. Bhan, Secretary, Government of India, Department of Biotechnology, New Delhi.
13th Oration	April 6, 2011	Dr Vishwa Mohan Katoch, Secretary to the Government of India, Department of Health Research, Ministry of Health and Family Welfare and Director-General, Indian Council of Medical Research, New Delhi.
14th Oration	April 6, 2012	Prof. Sami Bahna, Chief, Allergy and Immunology Section, Lousiana State University, LA, USA, and Past-President, American College of Allergy, Asthma and Immunology, USA.
15th Oration	April 6, 2013	Dr W. Selvamurthy, Former Distinguished Scientist and Chief Controller R&D (LS&IC), DRDO, Ministry of Defence, Government of India, New Delhi.
16th Oration	April 6, 2014	Prof. P.S. Shankar, Emeritus Professor of Medicine, Rajiv Gandhi Institute of Health Sciences, Bangalore, Karnataka.
17th Oration	April 6, 2015	Prof. K.C. Mohanty, former Director-Professor, Department of Chest and TB, K.J. Somaiya Medical College and Hospital, Mumbai.

18th Oration	April 6, 2016	Prof. S.K. Jindal, former Head, Department of Pulmonary Medicine, Post Graduate Institute of Medical Education and Research, Chandigarh.
19th Oration	April 6, 2017	Prof. S.K. Katiyar, former Principal and Dean and Professor and Head, Department of Tuberculosis and Respiratory Diseases, Ganesh Shankar Vidhyarthi Memorial (G.S.V.M.) Medical College, Kanpur.

19th Prof. R. Viswanathan–VPCI Oration was delivered by Prof. S.K. Katiyar (centre), former Principal and Dean and Professor and Head, Department of Tuberculosis and Respiratory Diseases, Ganesh Shankar Vidyarthi Memorial Medical College, Kanpur

13th Prof. A.S. Paintal Memorial Oration, held on September 22, 2017, was delivered by Prof. K. Ravi, Former Professor and Head, Department of Physiology, V.P. Chest Institute, University of Delhi, Delhi. Professor Devesh Sinha, Dean of Colleges, University of Delhi, addressing the audience on the occasion

Prof. A.S. Paintal Memorial Oration

1st Oration	September 24, 2005	Prof. M.S. Valiathan, Honorary Adviser, Manipal Academy of Higher Education, Manipal (Karnataka).
2nd Oration	September 24, 2006	Prof P.N. Tandon, President, National Brain Research Centre Society, Gurgaon.
3rd Oration	September 24, 2007	Prof. P.N. Srivastava, First Chancellor, Manipur Central University, Imphal and former Vice-Chancellor, Jawaharlal Nehru University, New Delhi.
4th Oration	September 24, 2008	Prof. Nanduri R. Prabhakar, Director, Centre for System Biology of Oxygen Sensing, Department of Medicine, University of Chicago, USA.
5th Oration	September 24, 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.
6th Oration	September 24, 2010	Prof. Chulani Tissa Kappagoda, Professor of Medicine, University of California, Davis, USA.
7th Oration	September 23, 2011	Prof. J.S. Guleria, Senior Consultant (General Medicine), Sitaram Bhartia Institute of Science and Research, New Delhi and former Professor and Head, Department of Medicine, and Dean, AIIMS, New Delhi.
8th Oration	September 24, 2012	Prof. S.K. Jain, Senior Consultant, Respiratory Medicine, Max Hospital, NOIDA, Coordinator, DNB (Respiratory Medicine), Metro Hospital, NOIDA, Ex-Advisor and Member, Scientific Advisory Committee, NIREH (ICMR), Bhopal and Ex-HOD, Cardio-respiratory Physiology, VPCI.
9th Oration	September 24, 2013	Prof. Samir K. Brahmachari, Secretary, Government of India, Department of Scientific and Industrial Research, and Director-General, CSIR, New Delhi.
10th Oration	September 24, 2014	Prof. M. Fahim, Adjunct Research Professor, Department of Physiology, Hamdard Institute of Medical Sciences and Research, Jamia Hamdard, New Delhi and former Professor and Head, Department of Physiology, VPCI.
11th Oration	September 24, 2015	Prof. A.K. Prasad, Chairman, Influenza Foundation of India, and President, Indian Virological Society and former Professor and Head, Department of Respiratory Virology, VPCI.
12th Oration	September 23, 2016	Dr Ashima Anand, Principal Investigator, DST Research Project, V.P. Chest Institute, university of Delhi, Delhi.
13th Oration	September 22, 2017	Dr K. Ravi, Former Professor and Head, Department of Physiology, V.P. Chest Institute, University of Delhi, Delhi.

Prof. H.S. Randhawa Oration

1st Oration	January 12, 2015	Prof. Ziauddin Khan, Chairman, Department of Microbiology, Kuwait University, Kuwait.
2nd Oration	January 12, 2016	Prof. Indira Nath, former Faculty Member, Department of Pathology, All India Medical Institute of Medical Sciences, New Delhi.
3rd Oration	January 12, 2017	Prof. Subrata Sinha, Director, National Brain Research Centre, Gurugram, Haryana.
4th Oration	January 12, 2018	Prof. Rajesh S. Gokhale, Former Director, CSIR-IGIB, Delhi

4th Prof. H.S. Randhawa Oration, held on January 12, 2018, was delivered by Rajesh S. Gokhale, Former Director, CSIR-IGIB, Delhi

Dr V.K. Vijayan Oration

1st Oration	October 26, 2015	Dr Soumya Swaminathan, Secretary, Department of Health Research, Ministry of Health and Family Welfare, Government of India, and Director-General, ICMR, New Delhi.
2nd Oration	October 26, 2016	Prof. Digambar Behera, Head, Department of Pulmonary Medicine, Post Graduate Institute of Medical Education and Research, Chandigarh.
3rd Oration	October 24, 2017	Prof. Seyed Ehtesham Hasnain, Vice Chancellor, Jamia Hamdard, New Delhi.

3rd Dr V.K. Vijayan Oration, held on October 24, 2017, was delivered by Prof. Seyed Ehtesham Hasnain, Vice Chancellor, Jamia Hamdard, New Delhi. Prof. A. Ray, Director (Acting) addressed the audience on this occasion

THE INSTITUTE

The Vallabhbhai Patel Chest Institute (VPCI) is a post-graduate medical Institution devoted to the study of chest diseases. It is located in the Delhi University main campus providing the requisite academic environment in which a wide range of scientific facilities are available in various departments along with an excellent Institute Library.

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 to 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 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, Cardio-respiratory Physiology, Radiodiagnosis and Imaging, Respiratory Allergy and Applied Immunology, Pulmonary Medicine and Thoracic Surgery. These Departments along with Outdoor/ Indoor patient care services and Respiratory 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.

Institute's Day was celebrated on January 12, 2018. A Patient Education Centre was inaugurated by Prof. Rakesh Bhatnagar, Chairman, Governing Body of the Institute (Above panel). On this occasion, 4th Prof. H.S. Randhawa Oration was delivered by Prof. Rajesh K. Gokhale, former Director CSIR-IGIB. Some of the former employees were honoured for their services on this day (below panel)

GOVERNING BODY

CHAIRMAN The Vice-Chancellor, University of Delhi (Ex-Officio) or a person nominated by him	**Prof. Rakesh Bhatnagar** School of Biotechnology Jawaharlal Nehru University New Mehrauli Road, Near Munirka Delhi - 110067
MEMBERS Treasurer, University of Delhi (Ex-Officio)	**Shri T.S. Kripanidhi**
Two members nominated by the Executive Council, University of Delhi	**Prof. V.K. Chaudhary** **Prof. M.K. Pandit** *(09.06.2016 onwards)*
Dean, Faculty of Medical Sciences, University of Delhi	**Prof. A. Ray** *(till 31.10.2017)* **Prof. Rachna Gupta** *(01.11.2017 onwards)*
Three members nominated by the Ministry of Health and Family Welfare, Government of India, New Delhi	**Mrs Vijaya Srivastava** Additional Secretary and Financial Advisor **Shri Sudhir Kumar** Joint Secretary **Dr Jagdish Prasad** Director General of Health Services
One member, not connected with the University, nominated by the Executive Council, University of Delhi	**Dr Yogendra Singh** Chief Scientist, CSIR-Institute of Genomics & Integrative Biology, Mall Road, Delhi-110007
One Professor of the Institute by rotation according to seniority for a period of one year	**Dr Mandira Varma-Basil** *(till 02.11.2017)* **Dr Madhu Khanna** *(03.11.2017 onwards)*
One Reader or Lecturer of the Institute by rotation according to seniority for a period of one year	**Dr Vishal Bansal** *(till 02.11.2017)* **Dr Ritu Kulshreshta** *(03.11.2017 onwards)*
Representative of Non-teaching Staff of the Institute by rotation (as Special Invitee) according to seniority for a period of one year	**Shri Parvinder Kumar**
MEMBER-SECRETARY	
Director Vallabhbhai Patel Chest Institute, University of Delhi, Delhi (Ex-Officio)	**Prof. S.N. Gaur** *(till 31.05.2017)* **Prof. A. Ray** *(01.06.2017 – 31.10.2017)* **Prof. Raj Kumar** *(01.11.2017 onwards)*

Standing Finance Committee

Additional Secretary and Financial Advisor — *Chairman*
Ministry of Health and Family Welfare
Government of India
Nirman Bhawan
New Delhi-110 001

Joint Secretary or Nominee — *Member*
Ministry of Health and Family Welfare
Government of India
Nirman Bhawan
New Delhi-110 001

Prof. Raj Kumar — *Member*
Department of Pulmonary Medicine
V.P. Chest Institute
University of Delhi, Delhi -110 007

Joint Registrar — *Member*
V.P. Chest Institute
University of Delhi, Delhi-110 007

Director — *Member-Secretary*
V.P. Chest Institute
University of Delhi, Delhi-110 007

Scientific Advisory Committee

Dr V.K. Vijayan — *Chairman*
[Former Director, VPCI]
12, Lesly Vilas, Karaparamba
Kozhikode-673010 (Kerala)

Deputy Director General — *Member*
National Programme for Control of Blindness
Ministry of Health and Family Welfare
Government of India
New Delhi-110001

Principal — *Member*
University College of Medical Sciences (UCMS)
Delhi-110095

Dr Rohit Sarin — *Member*
Director
National Institute of TB and Respiratory Diseases
Sri Aurobindo Marg, New Delhi-110030

Dean — *Member*
Faculty of Science
University of Delhi, Delhi-110007

Dean — *Member*
Faculty of Medical Sciences
University of Delhi, Delhi-110007

Prof. Raj Kumar — *Member (One year term according to seniorority 01.08.2017 onwards)*
Head, Department of Pulmonary Medicine
Vallabhbhai Patel Chest Institute
University of Delhi, Delhi-110007

Prof. S.K. Bansal — *Member (One year term according to seniorority 01.08.2017 onwards)*
Head, Department of Biochemistry
Vallabhbhai Patel Chest Institute
University of Delhi, Delhi-110007

Prof. K. Ravi — *Member*
[Former Head, Department of Physiology, VPCI]
7C2 Condor Daffodils, Upper Meridian Road
Kuravankonam, Kowdiyar P.O.
Thiruvanathapuram-695003 (Kerala)

Director — *Member-Secretary*
V.P. Chest Institute
University of Delhi, Delhi-110007

Human Ethics Committee

Dr V.K. Vijayan — *Chairman*
[Former Director, VPCI]
12, Lesly Vilas, Karaparamba
Kozhikode-673 010 (Kerala)

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

Dr Kavita Gulati — *Member*
Department of Pharmacology
Vallabhbhai Patel Chest Institute
University of Delhi, Delhi-110 007

Prof. S.K. Chhabra — *Member*
Former Head
Department of Cardio-respiratory Physiology, VPCI
E-67, South Extension-I
New Delhi-110 049

Dr Balakrishnan Menon — *Member*
Department of Pulmonary Medicine
Vallabhbhai Patel Chest Institute
University of Delhi, Delhi-110 007

Shri Dhirendra Kumar Jha — *Member*
Advocate, Supreme Court of India
Chamber No. 597, Patiala House Court
New Delhi-110 001

Dr Sushma Yadav — *Member*
Professor, Pulic Policy and Governance
Indian Institute of Public Administration
IP Estate, New Delhi-110 002

Deputy Registrar (Examination) — *Member*
University of Delhi, Delhi-110 007

Prof. S.K. Bansal — *Special Invitee*
Head, Department of Biochemistry
Vallabhbhai Patel Chest Institute
University of Delhi, Delhi-110007

Director — *Member-Secretary*
V.P. Chest Institute
University of Delhi, Delhi-110 007

Institutional Animal Ethics Committee

Chairman (Biological Scientist)	**Prof. A. Ray** Head, Department of Pharmacology V.P. Chest Institute University of Delhi, Delhi-110 007
Member (Scientist from Different Discipline of the Institute)	**Dr Mandira Varma-Basil** *(till 27.03.2017)* Dr Malini Shariff (28.3.2018 onwards) Department of Microbiology
Member (Scientist from Different Discipline of the Institute)	**Dr Madhu Khanna** Department of Virology
Member (Scientist Incharge of Animal House Facility of the Institute)	**Dr Vishal Bansal** *(till 27.03.2017)* Department of Physiology **Dr Kavita Gulati** *(28.03.2017 onwards)* Department of Pharmacology
Main Nominee of CPCSEA	**Dr Sarman Singh** *(till 27.03.2017)* Professor, Department of Laboratory Medicine All India Institute of Medical Sciences Ansari Nagar, New Delhi-110 029 **Dr Harmeet Singh Rehan** *(28.03.2017 onwards)* Head, Department of Pharmacology Lady Hardinge Medical College New Delhi-110 001
Link Nominee of CPCSEA	**Dr Dinesh Kanwar Yadav** *(till 27.03.2017)* B-66/B, Kalkaji, New Delhi-110 019 **Dr Bal Gangadhar Roy** *(28.03.2017 onwards)* EFA, Institute of Nuclear Medicine and Allied Sciences Delhi-110 054
Nominee of CPCSEA (Scientist from Outside the Institute)	**Dr R.J. Tirpude** *(till 27.03.2017)* Scientist-E and Joint Director Defence Institute of Physiology and Allied Sciences Delhi-110 054 **Dr H.B. Singh** *(28.03.2017 onwards)* Ministry of Science and Technology, New Delhi-110 001
Nominee of CPCSEA (Non Scientific Socially Aware Member)	**Shri Hans Raj Punhani** *(till 27.03.2017)* 124, Bank Vihar Apartments, Sector-22, Plot No. 16 Dwarka, New Delhi-110 075 **Shri Mahendra Yadav** *(28.03.2017 onwards)* Plot No 61, Flat No. D-2, Sector 5, Rajender Nagar Ghaziabad-201 005
Member-Secretary (Veterinarian of the Institute)	**Dr Rajinder Bajaj**

ORGANISATIONAL STRUCTURE

DIRECTOR *(Acting)*
S.N. GAUR, MD, PhD (Medicine), FCCP (USA), FNCCP (I), FCAI *(till 31.05.2017)*
A. Ray, MD, PhD, MNAMS, FAMS *(01.06.2017 to 31.10.2017)*
Raj Kumar MD, MNASc, FNCCP (I), FCAI, MIAOH, MAAAAI *(01.11.2017 onwards)*

Biochemistry

S.K. Bansal, MSc, PhD
Professor

Biostatistics

Mujeeb-ur-Rahman, MSc, PhD, PGDCP
Assistant Professor (Died on 06.05.2017)

Clinical Biochemistry

Vishwajeet Rohil, MD
Assistant Professor

Medical Mycology

(Mrs) Anuradha Chowdhary, MD
Associate Professor

Microbiology

(Mrs) Malini Shariff, MD, PhD
Associate Professor

(Mrs) Mandira Varma-Basil, MD, DNB
Associate Professor

Pathology

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

Pharmacology

A. Ray, MD, PhD, MNAMS, FAMS
Professor (Superannuated on 31.10.2017)

(Mrs) Anita Kotwani, MSc, PhD
Associate Professor

(Mrs) Kavita Gulati, MSc, PhD
Associate Professor

Physiology

K. Ravi, MSc, PhD
Professor (Superannuated on 30.04.2017)

Vishal Bansal, MD, DNB, PhD, MNAMS, FCCP (USA)
Assistant Professor

Pulmonary Medicine

S.N. Gaur, MD, PhD (Medicine), FCCP (USA), FNCCP (I), FCAI
Director- Professor (Superannuated on *31.05.2017*)

Raj Kumar, MD, MNASc, FNCCP (I), FCAI, MIAOH, MAAAAI *(01.06.2017 onwards)*
Professor

Nitin Goel, MD
Assistant Professor (Joined on 31.01.2018)

Sonam Spalgais, DNB
Assistant Professor (Joined on 01.02.2018)

Parul Mrigpuri, DNB
Assistant Professor (Joined on 23.02.2018)

Respiratory Allergy and Applied Immunology

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

Balakrishnan Menon, MD, DMRD
Associate Professor

Respiratory Virology

(Mrs) Madhu Khanna, MSc, PhD
Associate Professor

Viswanathan Chest Hospital

Officer-in-Charge

S.N. Gaur
Professor (till 31.05.2017)
Raj Kumar
Professor (01.06.2017 onwards)

Library
(Mrs) Uma Tyagi, MPhil (Physics), MLib Sc
Librarian

Animal House
Rajinder Bajaj, BVSc and AH
Veterinarian

Administration

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

Viswanathan Chest Hospital

The Viswanathan Chest Hospital (VCH) attached to the Vallabhbhai Patel Chest Institute has the following Departments/Facilities to provide specialised investigations and treatment to patients referred to this Institute.

Clinical Facilities

The Viswanathan Chest Hospital (VCH), formerly known as Clinical Research Centre, is the hospital wing of the Institute with the following Departments:

- Pulmonary Medicine
- Radiodiagnosis and Imaging
- Clinical Laboratories of Biochemistry, Microbiology and Pathology
- Anaestheia
- Thoracic Surgery

Facilities available at Viswanathan Chest Hospital

- Out-patient Department
- In-patient Facility with 128 Beds
- 24 Hours Respiratory Emergency
- 8-bedded Respiratory Intensive Care Unit (with 6 ventilators)
- Pulmonary Function Laboratory
- Cardio-pulmonary Rehabilitation Clinic
- Sleep Laboratory
- Allergy and Applied Immunology Laboratory
- Clinical Hematology and Pathology Laboratory
- Clinical Biochemistry Laboratory
- Microbiology Laboratory
- Radiology Unit with 64 Slice MDCT Scan Center
- Picture Archiving and Communication Systems (PACS)
- Tobacco Cessation Clinic
- Yoga Therapy and Research Centre

Specialized investigations available at VCH

- Fibreoptic bronchoscopy
- Guided FNAC/Biopsy
- Medical thoracoscopy
- Respiratory allergy skin tests
- Clinical immunology
- BACTEC system for tuberculosis

Detailed data of patients attending VCH during the year are as follows:

Number of new patients attending OPD	12087
Number of follow up patients visiting OPD	52161
Total Outdoor Patients	**64248**
Number of indoor patients	
General Wards	1587
Emergency Wards	2433
Total Indoor Patients	**4020**
Emergency treatment provided	35093
Total number of patients treated in ICU	360
Number of routine and specialised investigations done at VCH during the year	
Arterial blood gases	13774
Bronchoscopy	25
Bronchoalveolar lavage	75
Pulmonary function tests	24239
CT scans	2112
Ultrasounds	0
X-rays	23925
Electrocardiogram	4461
Polysomnograms	220
HIV testing	953
Clinical biochemistry	43170
Skin tests	1214
Serum IgE/IgG test performed	1104/1084
ANA	667
c-ANCA	571
p-ANCA	570
SCL-70	445
HBsAg	685
HCV	679
Serum ACE	754
Vitamin D	111
Thyroid Profile	551
Biochemistry	
Blood glucose	3,372
Liver function tests	19,740
Kidney function tests	16,632

Pleural fluid biochemistry	117
HbA1c	1,371
Lipid profile	1,938
Total	**43,170**

Microbiology

1. *Bacteriology Laboratory*

Clinical specimens processed for isolation and identification of aerobic pathogens

Nature of Specimen

Sputum	2271
Urine	550
Bronchial aspirate/ lavage	220
Pleural fluid	64
Blood	478
Endotracheal aspirate	122
Pus/(FNAC/Tips)	31
Others	11
Total	**3747**

2. *Serology Laboratory*

Rheumatoid factor	683
C-reactive protein	282
Widal	8
Total	**973**

3. Anaerobic Culture 91

4. Mycobacteriology Laboratory

Nature of Specimen

	LJ medium	**MGIT**	**GeneXpert**
Sputum	8338	269	1128
Bronchial aspirate	268	37	183
Pleural fluid	123	8	94
ET aspirate	63	2	12
CSF	8	4	2
Pus/Biopsy	34	8	11
FNAC	32	4	13
Total	**8866**	**332**	**1443**

Drug susceptibility test (DST) for *M. tuberculosis:* **90**

Line probe assay: Molecular DST for *M. tuberculosis*

Line probe assay for firstline drugs: 30

Line probe assay for *Mycobacterium sp.* 80

Parasitology:

Test for filarial antigen: 10

5. Mycology (VPCI and other hospitals)

Nature of Specimen	
Sputa	2458
Blood specimens	951
Bronchial lavage/aspirate/washings/endotracheal aspirate/pleural fluid	490
Blood culture	82
Tissue biopsies/ nasal polyps/skin scrapings/nail scrapings	97
CSF	29
Urine and Miscellaneous (swabs/nasal polyp/ FNAC/discharge/pus)	794
Total	**4906**

Besides, referral service for identification of clinical isolates of fungi was extended to other institutions on request.

Pathology

1. *Hematology Laboratory*

Hemogram	12,277
Platelet count	11,053
Absolute eosinophil count	3,845
Peripheral smear	135
P/S for malarial parasite	35
ESR	135
Reticulocyte count	01
Total	**27481**

2. *Coagulation Laboratory*

Prothrombin Time	563
Activated Partial Thromboplastin Time	306
D-Dimer	270
Fibrinogen Degradation Product	296
Bleeding time and Clotting time	608
Total	**2043**

3. *Clinical Pathology Laboratory*

Total of 767 Urine analysis were done during the period, including Specific gravity, pH, Albumin, Sugar, Microscopic examination and Ketone Bodies examinants.

4. *Histopathology Laboratory*

Lung biopsy- TBLB and EBLB	36
Skin biopsy	03
Experimental lung biopsy	32
Total	**71**

5. *Cytopathology Laboratory:*

Sputum	284
BAL fluid	19
FNAB: Percutaneous	47
Transbronchial (TBNA)	01

Bronchial aspirate	13
Pleural fluid	38
Tracheal aspirate	01
Pus Cytology	02
Total	**405**

6. Immunohistochemistry using a panel of markers was performed on clinical biopsies/ experimental biopsies/ Cell blocks made from cytology material Napsin A, Carcinoembryonic antigen, Surfactant Protein C (SP-C), VEGF-1, caspase-3 and Bcl2, α-SMA, CK-7, bFGF, synaptophysin, Chromogranin-A, Common Leucocyte antigen, etc.

7. Molecular Pathology Laboratory

   EGFR Mutations were studied in Blood, Sputum, FNAC, Biopsy, Pleural fluid samples of 46 patients

   KRAS Mutations were studied in Blood, Sputum, FNAC, Biopsy, Pleural fluid samples of 36 patients

Tobacco Cessation Clinic

The tobacco related deaths and suffering from disease caused by tobacco consumption had raised the question that what should be done to protect the people from the trap of vicious circle of tobacco addiction. In this context, in November 2001, a tobacco cessation center established at Vallabhbhai Patel Chest Institute, with the support from World Health Organization and Ministry of health and family welfare. The activities of TCC were expanded in the year 2002 with the financial support from World Health Organization (WHO) and Ministry of Health and Family Welfare, Government of India to make it a more comprehensive programme Centre. Further, the TCC was upgraded in the year 2009 as Resource Centre for Tobacco Control. The Institute's Tobacco Cessation Clinic has been providing its services since in outpatient department at hospital wing from Monday to Friday at 9:00 AM to 5:00 PM to the tobacco users. The services offered at the clinic in the form of Counselling, NRT (nicotine replacement therapy), non-NRT including CoHb monitoring, quit date plan follow-up, telephonic follow-up and pulmonary function test are being performed here. The clinic is also trying to create awareness among the general public and OPD patients about the negative effects of tobacco and about tobacco cessation through power point presentation, booklet, and videos. Registered person is being called for regular follow-up at an interval of 2 weeks followed by 1 month, 2 months, 3 months, 6 months and 1 year.

Moreover, TCC conducts workshops regularly in different parts of Delhi and NCR to train the physicians, counsellors, volunteers and other stake holders involved in smoking cessation. Since inception, TCC conducted 57 educational programmes for physicians, para-medical professionals and general public. TCC supplies educational materials in the form of booklets, pamphlets, stickers, etc, for physicians and general public. Since the inception of TCC to 31st March, 2018, 7836 new tobacco users and 3208 follow-up tobacco users availed the services. 432 new and 295 follow-up subjects user came for tobacco cessation in TCC, from 1st April 2017 to 31st March 2018. Follow up telephonic calls made to 432 subjects (Tobacco Users) registered in this duration to access their present abstinence rate. Out of these, 271 (62.73%) subjects contacted, rest could not be contacted due to switch off, person not available, expire, call not answering, out of station, caller busy, number does not exist etc.

In these follow up calls we found that 127 (46.86%) subjects have the continuous abstinence rate of 2 weeks, 105 (38.75%) subjects have the continuous rate of 1 month, 73 (26.94%) subjects have the continuous rate of 3 months, 33 (14.67%) subjects have the continuous rate of 6 months, 12 (7.36%) subjects have the continuous rate of 9 months and 6 (5.02%) subjects have the continuous rate of 12 months.

Yoga Therapy and Research Centre

The Yoga Therapy and Research Centre conducted yoga classes in collaboration with the Morarji Desai National Institute of Yoga (MDNIY), New Delhi from Monday to Saturday during 8 AM to 4 PM at VPCI.

Yoga training classes run in different batches from 8 AM to 4 PM daily to teach different Yoga therapy to heal the diseases of patients come to attend these therapy classes.

Yoga sessions are specially designed for the management and eradication of different health disorders, like

bronchial asthma, hypertension, stress, obesity etc. the patients first reports to yoga OPD at VPCI during the period 9.00 AM to 3.00 PM Monday to Friday by Doctors and Yoga staff there after obtaining the case history of the patient, necessary counselling is given by the yoga ARO. Then the patient is advised to undergo yoga training and educational session according to individual's health problems for a particular period till the healing of disease. The patient is re-examined to note the improvement made by him /her by the yoga Therapist. Then patient is advised for a regular home programme with an advice to attend the training sessions once or twice a week at the Yoga Centre for better health and quality of life and to keep them healthy. Special yoga sessions for staff of VPCI are also arranged time to time.

Yoga Therapy and Research Centre, Vallabhbhai Patel Chest University of Delhi in collaboration with Morarji Desai National Institute of Yoga, New Delhi, Department of Ayush, Govt. of India under the supervision of Dr B.K. Menon, Nodal Officer and Director (Acting), Prof. S.N. Gaur and Prof. Raj Kumar and Mr. Manoj Kumar, Yoga Therapist conducted the Second International Day of Yoga program on 21 June, 2017 at Paintal Memorial Golden Jubilee Auditorium of the Institute in which yoga team follow the common yoga protocol and imparted training to all staff, students VPCI, yoga students and children.

Cardio-pulmonary Rehabilitation Clinic

Cardio-Pulmonary Rehabilitation Clinic at Vishwanathan Chest Hospital, VPCI is involved in management of chronic respiratory patients who have disability in activities of daily living and exercise limitation due to shortness of breath despite being on optimal pharmacological treatment.

Patients are advised to enroll in supervised rehabilitation program which can help them regain their functional capacity, reduce breathlessness and help them get their life back. A comprehensive pulmonary rehabilitation includes education on disease information, energy conservation, lung health, bronchial hygiene, chest physiotherapy, nutrition, optimization of medication intake, domiciliary oxygen usage, stress management, breathing retraining, inspiratory muscle training and strength & endurance training of upper and lower limbs.

Clinic Timings:

- **Monday to Friday: 9.00 A.M. to 1.00 P.M.**
- **Numbers of patients attended in Cardio-Pulmonary Rehabilitation Clinic**
  (1st April, 2017 - 31st March 2018)
  - **Breathing retraining & education** **257**
  - **Completed Supervised Rehabilitation program** **67**
    (Intensive & Maintenance)

Multidisciplinary Research Unit

The VPCI-DHR-ICMR- Multi-disciplinary research unit (MRU) was established and made functional during the year 2015-16. This MRU is a part of the Government of India initiative for establishment of multi-disciplinary research units in Government medical colleges/research institutions during the 12th Plan period. The scheme was implemented by the Department of Health Research with the technical support of ICMR. This path-breaking programme aims to develop/strengthen the health research infrastructure in the country. Under this scheme, financial assistance of upto 5.25 crores is to be provided for setting up of modern biological lab/multi-disciplinary research unit at VPCI.

The objectives of the scheme are: (i) to encourage and strengthen the environment of research in medical colleges; (ii) to bridge the gap in the infrastructure which is inhibiting health research in the medical colleges by assisting them to establish multi-disciplinary research facilities with a view to improve the health research; (iii) to ensure the geographical spread of health research infrastructure, in order to cover un-served and underserved medical colleges and other institutions; and (iv) to improve the overall health status of the population by creating evidence-based application of diagnostic procedures/processes/methods.

The VPCI-DHR-ICMR-Multi-disciplinary research unit aims (i) to undertake research in non-communicable diseases and other need-based research employing newer tools and (ii) to promote and encourage quality medical research in the institution.

1. Designing of Inhalation based polymeric nanoparticle drug delivery systems for the treatment of lung fibrosis

Lung fibrosis is a chronic progressive form of lung injury that has a high morbidity and mortality. Current therapeutic approaches have limited success in its treatment. Oral pirfenidone therapy has shown low half life~2.5h requiring a higher oral dose leading to increased side effects such as gastroesophageal reflux diseases (GERD), phototoxicity etc. Hence better delivery to the target organ is required in order to achieve maximum effects. Pulmonary nanoparticle based drug delivery via inhalational route is a relatively new concept that may be promising for treatment of chronic lung diseases. Nano based systems are being strategically designed to enhance the therapeutic index of antifibrotic drugs. These include biodegradable polymeric nanoparticles such as Poly (D, L) Lactide (PLA), poly (DL-lactide-co-glycolide acid; PLGA), starch, chitosan etc.

In the present study, blank nanoparticles of PLA (Resomer R202H, Sigma Aldrich Ltd) and Polycaprolactone (PCL) (Mol wt 14,000, Sigma Aldrich Ltd) were prepared by using a water/oil/water emulsion method. Various process parameters, including (a) polymer amount (30/50/100 mg), (b) mixing technique of organic and aqueous phase (sonication/ magnetic stirring), (c) type of solvent (acetonitrile, ethyl acetate, dichloromethane either individually or in combination) and (d) type of surfactant (Span-20, PVA (polyvinyl alcohol), Pluronic F-127, Tween-20) and surfactant amount (0.5/2/4%) were titrated for optimization of nanoparticle synthesis. Pirfenidone (Sigma), an anti-fibrotic agent and Epigallocatechin (EGCG), an active component of green tea, having antioxidant properties were then loaded into the PLA nanoparticles, either individually or in combination in different concentrations. The size and shape of nanoparticles were characterized by Nanosight size analyzer and Transmission Electron Microscopy (TEM) respectively.

The average diameter of the blank PLA nanoparticle was 140 nm. The surface morphology of PLA nanoparticles was best observed when 30 mg polymer was mixed with acetonitrile solvent using sonication and 2% PVA as surfactant. Increasing PVA concentration (Both Polymer as well as emulsifier) increased the size of the blank nanoparticles. The average diameter of the blank PCL nanoparticle was 175 nm. The surface morphology of PCL nanoparticles was best observed when 30 mg polymer was mixed with ethylacetate solvent using magnetic stirring and 0.1/0.5% pluronics as surfactant. Increasing surfactant concentration reduced the size of the blank nanoparticles. EGCG in different concentrations (2.5/5/1.0 mg/mL) was then loaded on blank PLA nanoparticles.

Nanoparticle mediated drug delivery to the lung are innovative and promising alternatives to conventional inhaled drugs as they can circumvent pulmonary clearance mechanisms, sustain lung pirfenidone delivery, provide

enhanced therapeutic efficiency and controlled drug release and thereby prove to be cost effective regimens in long term management of chronic fibrotic lung diseases. Pharmacology, immunology, toxicology and large scale manufacturing (Stability and activity of drugs) are further aspects that need to be taken into consideration for the development of inhalable nano based antifibrotic drug therapy for pulmonary fibrosis.

2. bFGF/FGFR-1,2 signaling pathway during the remodeling of pulmonary extracellular matrix

Basic fibroblast growth factor (bFGF) is a potent chemotactic and mitogenic factor for cells of mesodermal, ectodermal, and endodermal origin, including smooth muscle cells and myofibroblasts. The bioactivity of bFGF is mediated through high-affinity fibroblast growth factor receptors (FGFR) such as FGFR1 (Flg) and FGFR2 (Bek). On the basis of this we hypothesized that bFGF-/FGFR-1,2 signaling pathway contributes to smooth muscle cell/ myofibroblast–like cell hyperplasia in pulmonary. To test this hypothesis, we performed qRT-PCR and quantitative morphometric immunohistochemical studies of bFGF, FGFR-1,2 expressing smooth muscle cell/myofibroblast–like cells in relation to extracellular matrix.

Male Wistar rats (n=24), 120-150 grams, were divided into Group I: control (intratracheal 0.9% saline), Group II: experimental (intratracheal bleomycin sulphate 7 I.U/kg bw). Animals were sacrificed on day 0, 7, 14 and 28 days and mRNA and protein expression of basic fibroblast growth factor, bFGF; and their receptors (FGFR-1, FGFR-2) were studied. Primers for qRT PCR of bFGF, FGFR1 and FGFR2 genes were designed using NCBI and Primer Express (ABI). Results: Bleomycin instillation resulted in a significant progressive increase in bFGF mRNA and protein expression from early cellular phase (day 7) upto fibrotic phase (day 28). bFGF was detected in interstitial histiocyte–like cells. on epithelial cells (especially adjacent to smooth muscle cell/myofibroblast–like cells), basement membrane, endothelial cells, and weakly on smooth muscle cells. A differential expression of their receptor genes was seen with significant increase in FGFR1 mRNA expression in both phases while a reduction in FGFR2 mRNA levels was seen in fibrotic phase. This correlated with increased cellular expression of FGFR-1and FGFR-2 in bronchiolar epithelial cells, alveolar macrophages and interstitial cells from Day 7 to 28. FGFR1 (Flg) antibody bound to smooth muscle cell/myofibroblast–like cells, type-II epithelial cells and alveolar macrophages. FGFR2 (Bek) was detected predominantly in the proliferative clusters of smooth muscle cell/myofibroblast–like cells and weakly on epithelial cells and alveolar macrophages. The finding of enhanced expression of Flg on epithelial, endothelial, and smooth muscle cell/myofibroblast–like cells is consistent with the evidence that these cells contribute to the fibrogenic response. Interestingly, whereas Bek receptor was expressed on some interstitial cells, total Bek mRNA expression was not significantly increased.

The bFGF/FGFR1,2 signalling from the early cellular phase is crucial for their transformation to myofibroblasts and progression of epithelial myoepithelial transition (EMT). In the fibrotic phase the FGFR2 expression reduces while FGFR1 persists. This correlates with the progression to fibrotic phase. At this time, we have no explanation for this differential expression. Future in vitro studies of cells that differentially express these receptors may help clarify this divergence in receptor expression and its therapeutic potential in the management of pulmonary fibrosis.

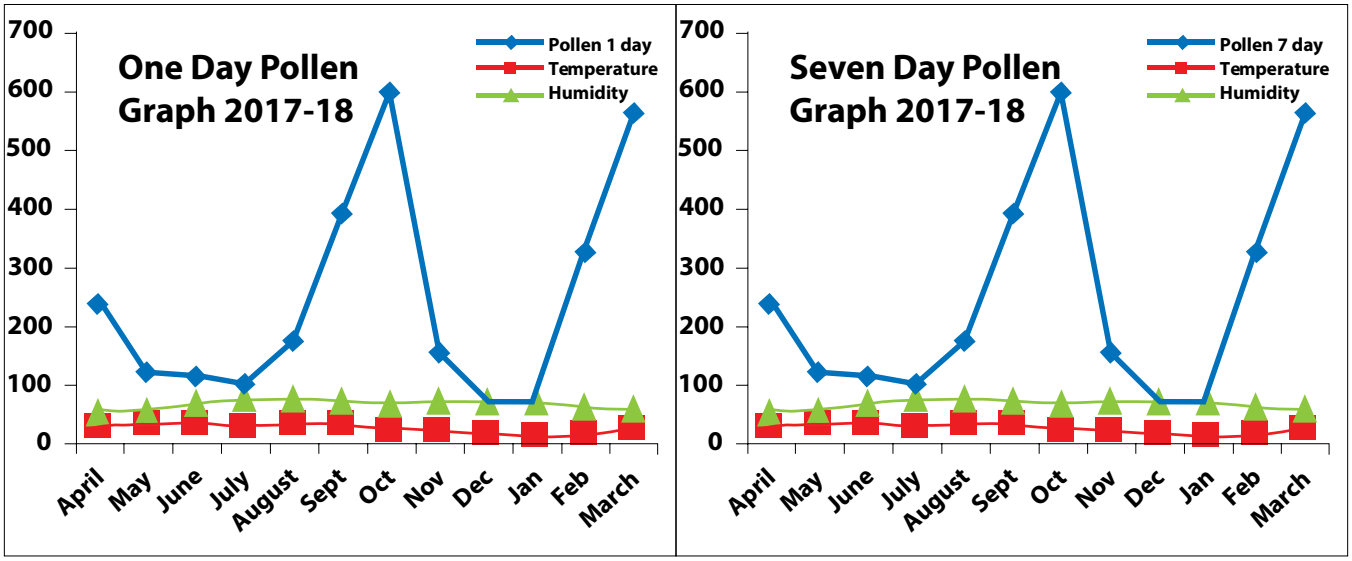
National Centre of Respiratory Allergy, Asthma and Immunology

The National Centre of Respiratory, Allergy, Asthma and Immunology (NCRAAI) was started in the year 2011 with an aim to conduct research and training on various aspects of allergy and asthma (aetiopathogenesis, diagnosis and treatment). A brief description about the activities of NCRAAI during the year is given below;

Study in Villages: The NCRAAI is conducting a study entitled, 'Indoor Air Pollution and Asthma Exacerbation in Children: A Population-based Study' in the village Dujana, GautamBudh Nagar, Tehsil – Dadri and Block-Bisrak of Uttar Pradesh. The study is funded by Indian Council of Medical Research (ICMR), New Delhi. During the period, 871 houses were surveyed (2842 adult females and 2224 adult males), 3200 pulmonary function tests (PFTs) were performed. Indoor particulate matter (PM10, PM2.5, PM1) was measured in 358 houses using environmental dust monitor system (GRIMM, UK). Volatile organic compounds were measured in 210 houses using a portable gas detector (PhoCheck TIGER, UK). Blood and urine samples were also collected for biochemical analysis.

POLLEN COUNT STATION at VPCI

The pollen count station at VPCI have two "Burkard Air Samplers" one is seven-day sampler and the other is one-day sampler. These samplers are running continuously and air samples are collected and studied on daily basis. During the period under report, 714 slides (351 Seven-day sampler slides and 363 One-day sampler slides) were analysed. Total number of slides mounted from the establishment of pollen count station were 3086 (1701 Seven-day sampler slides and 1385 One-day sampler slides) till date. Month-wise data for pollen count, temperature and humidity level from 1st April 2017 to 31st March 2018 are given below:



Programme organised

A two-day 1st Indian Summit on Allergy Diagnosis and Allergen Immunotherapy was organised by NCRAAI in collaboration with University Klinikum Munster, Germany at Paintal Memorial Golden Jubilee Auditorium, VPCI from December 8-9, 2017.

National Tobacco Quitline Services

"NATIONAL TOBACCO QUITLINE SERVICES" was launched and inaugurated by Honorable Union Minister of Health and Family Welfare, Government of India Shri Jagat Prakash Nadda on 30th May 2016. The project is financially supported by Ministry of Health and Family Welfare and runs under the aegis of Vallabhbhai Patel Chest Institute, University of Delhi. National Tobacco Quitline Services (NTQLS) is confidential, non-judgemental telephone-based counselling, information and referral service for anyone seeking help to quit tobacco for their own or another person's tobacco use. The NTQLS is accessed through a toll free no. 1800-11-2356. The programme is headed under the supervision of Prof. Raj Kumar, Director (Actg.), Vallabhbhai Patel Chest Institute, University of Delhi. It is operational 6 days a week, (Tuesday to Sunday 8AM to 8PM) following WHO protocol of Quit-line services.

The process of National Tobacco Quitline Services

- Make a call to the service on toll free number 1800-11-2356
- All the conversation & information will be kept confidential
- Select the preferred language (Hindi or English)
- Callers will be registered with this service and the assessment will be done
- We will arrange for follow up calls and call you back as per your convenience
- Quit pack will be sent via mail/email

Call Sequence

Call 1 – Call made by caller.
Call 2 – Pre-quit date call made by the counsellor 3-4 days before the planned quit date
Call 3 – Quit date call made by counsellor on the planned quit date
Call 4 – Quit date follow up call made by counsellor 3-7 days after the planned quit
Call 5 – Ongoing support call made by counsellor about 1-3 weeks after the quit date, follow up call

The evaluation of this quitline from 1st April 2017 to 31st March 2018 is that the total number of calls handled during this period which includes total inbound which are 15231, total outbound which are 58404, total IVR 35645 total registered numbers which are 3307. The success rate of this Quitline during this period which has been seen is 758 successful registered quitters.

NTQLS awareness programme was organised at V.P. Chest Institute on 25th February 2018 from 6:30 AM to 9:30 AM. Approximately, 1500 people participated in the event. There were many sub events including walkathon, skating, cycling, aerobics, mock fire drills, and self-defense sessions for women by Delhi Police. The distribution of educational material kit amongst the audience was done by the counsellors and supervisors along with clarification of their doubts by providing important useful information. We successfully promoted our toll free number at macro level.

E-Hospital Services

As per directions of Ministry of Health and Family Welfare, Government of India, Dr Vishal Bansal, was nominated as Nodal Officer along with Mr Sunil Kumar, Technical-in-Charge to look after e-hospital and associated modules at the Institute. These modules include: (1) e-hospital: Phase-I (Patient registration and Billing); (2) ORS: Online Registration System; (3) *Mera Aspataal:* Patient feedback services and (4) Digital Payment: Promotion of digital payment services. Details of these modules are given below:

1. e-hospital

e-Hospital[@NIC] is an open source health management information system (HMIS) which is configurable and easily customizable with multi-tenancy support. It is designed to upload patient data on cloud infrastructure and connect with multiple hospitals across the country seamlessly. Any patient or treating doctor can log-in to access electronic health record (EHR) anytime, anywhere with defined access control and authentication mechanism.

e-Hospital[@NIC] is a generic application, which addresses all the major functional areas of a hospital. It is workflow based HL7 compliant and ISO/IEC 9126 certified end-to-end solution software for hospital management which covers and integrates all the functional arms of both out-patient as well as in-patient treatment cycle. It integrates OPD/IPD registration, billing, investigation reporting, medicine disbursal, insurance coverage and inventory management. An Integrated HMIS Suite consists of HIS, LIS, RIS, PACS, Blood Bank and Telemedicine Suite.

Customized configuration of e-Hospital[@NIC] Phase-I software for VPCI has been completed and service will be implemented soon after installation of requisite hardware, infrastructure and enrollment of manpower.

2. Online Registration System

Online Registration System (ORS) is a framework to link various hospitals across the country. It is a Photo ID- or Aadhaar-based online registration and appointment application installed at hospitals where counter-based OPD registration and appointment system has been digitalized through HMIS.

Patients can select a specific department/doctor and book an appointment through this portal (https://ors.gov.in). The application has been hosted on the cloud services of NIC. This portal facilitates online appointments with various departments of different Hospitals using eKYC data of Aadhaar number, if patient's mobile number is registered with UIDAI. In case mobile number is not registered with UIDAI, it uses patient's name. New patient will get an appointment as well as allotted a Unique Health Identification (UHID) number. If Aadhaar number is already linked with UHID number, then only appointment number will be given and UHID will remain the same.

VPCI started the facility of Online Registration System from 01-12-2017 which can be accessed on http://vpci.org.in.

3. *Mera Aspataal*

मेरा अस्पताल (My Hospital) is Ministry of Health, Government of India initiative to capture patient feedback for the services received at the hospital through user-friendly multiple channels, such as Short Message Service (SMS), Outbound Dialling (OBD) mobile application and web portal. Patients can submit their feedback in seven different languages on mobile app and web portal for the government funded hospitals visited in last seven days. Patient feedback is compiled, analyzed and visualized in the form of a dashboard accessible to the different stakeholders at facility, district, state and national level. Patients can also check already submitted feedback. This application will help the government to take appropriate steps for enhancing the quality of health-care delivery across public facilities which will ultimately improve patient's experience.

My Hospital will ultimately help establish patient driven, responsive and accountable health-care system.

VPCI has been integrated with *Mera Aspataal* application on 14-06-2017.

4. Digital Payment

Digital India programme is a flagship programme of the Government of India with a vision to transform India into a digitally empowered society. Promotion of digital payments has been accorded highest priority by the Government and is one of the key highlights of the Union Budget 2017-2018. Digital transactions through five payment modes namely: UPI, USSD, Aadhar Pay, IMPS and Debit cards has been emphasized.

Ministry of Health and Family Welfare has directed all the public and private Health Care Organizations (HCOs) for enabling all customer touch points with digital payment acceptance infrastructure so that patients/citizen can pay by means of UPI, BHIM, Mobile wallet, Credit and Debit Cards in various health-care organizations.

Present status of e-hospital services at VPCI

- Total target allocated for digital transaction was 10 Lakh for the financial year 2017-18.
- Monthly reporting of details of digital transaction is done on MIS portal –_https://dp.nhp.gov.in/index.php_by the Accounts section, VPCI before 3rd of every month.
- Five POS machines have been installed at registration counter, cash counter at accounts section, canteen, ward and ICU to facilitate digital transactions.
- Payment to vendors and various service providers is also being made digitally through RTGS, NEFT and ECS.
- Awareness about the availability of digital payment facility for patients and citizens is being implemented through information displayed on small posters pasted at various locations in the institute premises.

e-hospital at VPCI can be accessed at: http://vpci.org.in and http://ehospital.gov.in

Animal House

The Animal House of the Institute is registered for breeding and experiment on animals with Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA), Animal Welfare Division, Government of India, for breeding and conducting experiment on small Laboratory Animals vide registration no. 170/GO/ReBi/S/99/CPCSEA.

The Animal House of the Institute provide optimum environment for experimental animals, which is essential for obtaining reliable experimental research. The most reliable results will be obtained from animals that are healthy, unstressed and at ease with their surroundings

The Animal House of the Institute is being maintained under controlled environment conditions as specified in CPCSEA guidelines with maintained temperature, relative humidity, timer controlled light dark cycle and air change per hour with 100% fresh air.

All experiments involving animals are approved by the Institutional Animal Ethics Committee (IAEC), which is constituted by CPCSEA. Institutional Animal Ethics Committee (IAEC) keeps a check to promote the humane approach of animal experimentation with the basic objective of providing specifications that will enhance animal care and quality in the pursuit of advancement of scientific knowledge that is relevant to humans and animals.

The Animal House is managed by a team of well qualified Veterinarian, Technical Assistant and Attendants who are experienced and trained in modern methods of animal care, breeding and husbandry.

Library

The VPCI Library is providing patient care information support and catering to the academic needs of the faculty members, resident doctors, researchers and students alike for research purposes. It forms a part of Institute support services and acquires thought process, collate and disseminates global information in the field of Biomedical Sciences with specialization in pulmonary diseases and allied sciences. The library started in 1955, but it has back volumes of several journals more than 100 years old. Most of the journals have complete sets of volumes originating right from their treatises of medicine which are readily available for basic and historical insights. It also has a very good comprehensive collection of serial publications like Annual Reviews, Years books, Recent advances. The Institute has one of the best library in the field of Pulmonary Disease and Allied Sciences having 10,086 Books, J-25,025 bound Journals, 175 CD's, 566 Thesis and 20 National and International Reports. A total of 115 Journals (110 International and 05 National) are being subscribed by the library, 16 Journals (06 International and 10 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. To cover the need for daily coverage of news related to the medical field, Library is also subscribing four English and four Hindi newspapers. This has encouraged the inculcation of reading habits of all alike.

Library render 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, reference and specific information, if required. Apart from this, online searches are being carried out for providing instant access of Information Resources to the desktop of researchers through LAN (Local Area Network). The Internet services have been provided right on the desktop of each Faculty Member through LAN and Leased line connectivity with 10 Mbps from MTNL. Library also provides inter-library loan facilities and reprographic services on demand.

The Library follow 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 provide 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 facilities are available to Members/Users of Delhi University from Monday to Friday [8:30 AM to.8:00 PM] & Saturday 9.00 AM to 5:30 PM (Reference & Reading Purpose).

Publication Division

Publication Division of the Institute has been publishing a quarterly periodical, *The Indian Journal of Chest Diseases and Allied Sciences* (IJCDAS), in collaboration with the National College of Chest Physicians (India). The Journal was 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 PubMed, 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 site:

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

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

DEPARTMENTAL ACTIVITIES

Biochemistry

(Including Biochemistry and Clinical Biochemistry)

Research

1. Studies on erythrocyte membrane protein profile and oxidant and antioxidant status of blood in bronchial asthma

The studies are being conducted on protein profile of erythrocyte membranes of asthmatics (mild persistent, moderate persistent, severe persistent and mild intermittent) and healthy controls. Our results have shown changes in 11 proteins in healthy versus asthmatic patients by 2D gel electrophoresis below molecular weight of 40 kDa. Among these 11, some of proteins were increasing/decreasing in asthmatic subjects. One of the proteins decreased in asthmatics, has been identified to be glyceraldehyde 3-phosphate dehydrogenase which is known to play an important role in oxidative stress.

2. A study on CRHR1 and GR gene polymorphism and their correlation with the expression of various inflammatory cytokines in asthma in North Indian population

The studies had been conducted on CRHR1 gene and certain inflammatory cytokines in blood of asthmatic patients and healthy subjects. The CRHR1 gene has been sequenced to find presence of SNP's. The sequencing in more number of samples has been done. However, same novel SNP's had been found in some more samples, which had been informed earlier. Cytokines viz. IL-2, IL-4, IL-6, IL-17, IL-22, IFN-γ were assayed in plasma samples of asthmatic and controls subjects. The substantial amount could be observed only of IL-6 cytokine, both in healthy and asthmatic patients and was found to be substantially increased in asthmatics.

3. Role of innate immune response mechanisms in development of bleomycin induced lung fibrosis

The innate immune response was studied in bleomycin induced mouse model of pulmonary fibrosis. It was observed that there was sterile interstitial inflammation via LMW-HA activation of the TLR-2, 4 and NFκB signaling after bleomycin injury. The downregulation of the TLR-2, 4 mRNA levels, upregulation and activation of TGF-β1 and development of protease/antiprotease imbalance with reversal of the MMP-9/TIMP- 1,3 ratios in favour of TIMPs appears to be the major mechanism that may lead to the progression of aberrant parenchymal remodelling to the fibrosis. The present study elaborates the role of the TLR-NFκB-TGF-β1-MMP/TIMP pathway in the immunopathogenesis of pulmonary fibrosis and emphasizes the potential of restoration of the same for target-based therapy (*work done in collaboration with Dr Ritu Kulshreshtha, Department of Pathology, VPCI*).

4. To elucidate the role of ellagic acid and its derivative via CRTAase in the gene expression profile of lung carcinogenesis

To explore the role of calreticulin transacetylase (CRTAase) using ellagic acid and its derivative and HDAC inhibitors (HDI) in the progression or suppression of lung cancer and to study the up-regulation or down-regulation of genes induced by CRTAase in presence or absence of HDI.

The Human NSCLC, lung adenocarcinoma A549 cell line has been maintained using DMEM media in a biosafety cabinet under strict aseptic precautions. Highly concentrated and purified (endotoxin free) plasmid DNA required for efficient transfection was obtained. Transfection efficiency was validated in untreated A549 Cell-line by Fluorescent Microscopy using Label Plasmid IT® Cy®3 Plasmid Delivery Control and the validation has been further confirmed by Western Blot elucidating the over-expression of CALR gene in transfected A549 cells in comparison to the control. In the study conducted IC50 of Ellagic Acid EA), Ellagic acid peracetate (EAPA) and Valproic Acid was obtained by MTT 72 hr Assay at 595nm.

The apoptotic activity of EA and EAPA has been validated by DAPI stain in A549 cells. RNA isolation followed by CDNA synthesis was was done in A549 cells using commercially available kit. Basal CT value of the lung cancer associated genes was obtained successive to the Melt Curve analysis confirming the absence of non-specific products in real-time PCR. A panel of lung cancer associated genes were selected; primers were designed and screened using RT-PCR. The results obtained were highly encouraging.We have customized the MicroArray Platform based on

our RTPCR results. The sample preparation for MicroArray Analysis is under process which will be outsourced to a contract research organization.

5. Regulation of TET2 protein by erythropoietin (EPO) during erythrocyte differentiation in human and to investigate its role in acute myeloid leukemia

To investigate the TET2 enzymatic activity in AML cases (which AML subtypes) as compared to normal controls in CD34+ purified population (blast from P blood? Or marrow stem cells?); to correlate the effect of TET2 mutations (by targeted re-sequencing) in our AML samples on its predictive enzymatic activity using in-silico structural predictions; and to investigate the effect of an altered TET2 activity on epigenetic landscape and gene expression in driving AML disease pathogenesis using whole genome expression array.

6. Identification of novel transcripts and non-coding RNA in Fuchs' endothelial corneal dystrophy (FECD)

Study was conducted to explore: (1) why do some individuals have severe problems, requiring transplant surgery, while others have milder phenotypic manifestations; (2) what is the extent of molecular heterogeneity for FECD; and (3) what are the functional importance of these novel genes (that will be found in our studies), particularly their role in normal ocular development and disease progression.

Biostatistics

The Department of Biostatistics plays a vital role and forms a supportive department of the research activities of the Institute. This department provides the statistical needs of all the research activities i.e. from planning stage of studies or surveys, protocol development designing study schedules/forms, sample size and power determination, collection and validation of data, collation, compilation, generating tables and graphics, analyses of data, and interpretation of the results of various research studies, in order to quantify the effect of risk factors and health interventions on individuals or population. The statistical analysis is being carried out using Statistical Package for Social Sciences (SPSS).

The Department conducts regular teaching programmes for the postgraduates (MD/DTCD) and doctoral (DM/PhD) students.

The Department has also been entrusted with the responsibility of preparing various reports (monthly, quarterly, half yearly and yearly) of VPCI (pertaining to patients care, patients investigations, patient status, morbidity pattern, communicable and non-communicable diseases; students, faculty and staff, income, expenditure, infrastructure, etc.) and their timely submission to various governmental agencies such as, Ministry of Health and Family Welfare, Government of India; Directorate of Health Services, Government of Delhi; University of Delhi, UGC etc.

The Department shoulders the responsibility of online reporting of vital events such as mortality and morbidity of notifiable diseases, in Viswanathan Chest Hospital, VPCI to the Municipal Corporation of Delhi in stipulated time period.

The Department also undertake responsibility of documenting and maintaining the database of various research protocols of DM/PhD/MD students. The Department has identifiable and collaborative research projects with other department of the Institute.

Microbiology

(Including Microbiology, Medical Mycology and Respiratory Virology)

Research

1. Isolation and characterization of anaerobic bacteria causing lower respiratory tract infections in patients attending VP Chest Institute, Delhi

One hundred and seventeen patients were included in the study up to February 2018, 71 males and 46 females. 44 and 73 patients were < 40 and >40 years of age respectively. The clinical samples included bronchial aspirates (111), pleural fluid (4) and FNAC (2). Out of these 117, 76 patients yielded anaerobes in their clinical samples. 43 patients had more than one type of anaerobic organisms. Hence, a total of 128 isolates were recovered belonging to as many as 16 genera. Sixty-one aerobic organisms were grown but most of them were commensals from the oral flora and hence were not considered significant. Only *Streptococcus pneumoniae and Klebsiella pneumoniae,* two each, were considered significant.

2. *Corynebacterium striatum:* an emerging respiratory pathogen

Corynebacterium spp are primarily considered normal flora. In recent years, *Corynebacterium striatum* has emerged as a multi-drug resistant human pathogen which can cause nosocomial outbreaks. The organism has infrequently been noted to cause respiratory infections. A study was conducted to identify the clinical and microbiological features of respiratory infection by *Corynebacterium striatum.*

C. striatum isolates from clinical, surveillance samples were tested for susceptibility to antimicrobials and typed by Random Amplification of Polymorphic DNA (RAPD). Clinical data was obtained through a retrospective review of records.

Fifteen isolates from clinical and surveillance samples of 11 hospitalised patients were included. The patients suffered from either an exacerbation of COPD (n=9) or pneumonia (n=2). The isolates were all multi-drug resistant. RAPD typing found no evidence of an outbreak/transmission between patients.

Corynebacterium spp must be considered a potential pathogens and should be identified to the species level since *Corynebacterium striatum* is often multi-drug resistant.

3. Phenotypic and molecular characterization of multidrug resistant bacterial uropathogens in South-eastern Nigeria

The aim of the study was to characterize the enterobacterial uropathogens with respect to drug resistance. Antibiotic susceptibility patterns and presence of various beta-lactamases were evaluated in 100 enterobacterial uropathogens. Presence of various β-lactamases genes were confirmed by PCR. Isolates showed variable resistance to most drugs tested. Out of the 58 ESBL screen positive *E. coli*, 35 were confirmed positive with PCR. The predominant gene was bla_{TEM}. Forty-three percent of the *E. coli* isolates was positive for various MBL genes. bla_{SPM} was the most predominant MBL gene. Ten (10) of the *E. coli* had co-expression of more than one MBL gene. Only 2 *E. coli* isolate were KPC positive. The study showed high prevalence of drug resistant genes among the enterobacterial uropathogens. Majority of the uropathogens harbored more than one antibiotic resistant gene and the most predominant gene was ESBL (bla_{TEM}) followed by MBL (SPM) gene.

4. Hospital Infection control surveillance

Routine surveillance of the hospital was performed at regular intervals to screen for the presence of pathogens. Various samples from ICU and ward like suction ports, oxygen masks and ports, Mattresses, airbed, bed railings, hand swabs from health-care professionals working in these units, environment samples etc were collected on 24th May 2017 and January and February 2018. The reports were submitted along with the recommendations.

5. Polymorphisms upstream to *embA* lead to high-level ethambutol resistance in clinical isolates of *Mycobacterium tuberculosis* from North India

Mutations in bacterial genome are the major cause of drug resistance in *Mycobacterium tuberculosis.* These polymorphisms thus act as an important tool in early diagnosis and subsequent treatment against drug resistant TB. Mutations at codon 306 in *embB* are the most prevalent polymorphisms in ethambutol (EMB) resistant clinical isolates. However, these are responsible for only 40-60% of the EMB resistant cases. In recent studies, mutations upstream to *embA* have been seen in EMB resistant isolates. The present study was therefore performed to find a possible association between EMB resistance and mutations in upstream region of *embA* along with *embB* and *embC* in clinical isolates of *M. tuberculosis* from North India. Of the 360 clinical isolates of *M. tuberculosis* obtained from patients of TB, 29 EMB resistant and 29 EMB susceptible isolates were included for further analyses. The mutational hotspot regions of *embB, embC* and upstream region of *embA* were screened for polymorphisms and the results correlated with the minimum inhibitory concentration (MIC) of EMB. Mutation (ATG to ATC/GTG) at codon 306 of *embB* was observed in 20/29 (65.51%) resistant isolates. Mutations in the upstream region of *embA* at positions -8, -11, -12 and -60 were present in 7/29 (24.13%) resistant strains of which 6/7 (85.71%) were observed in isolates with MIC of EMB ≥16 μg/ml. The upstream *embA* mutations were always accompanied by *embB* mutations, wherein *embB* Met306Val/Ile change was predominant. No mutations were observed in the *embC* locus. This investigation demonstrated that accumulation of polymorphisms at various loci viz. *embB* and upstream *embA* region, may contribute to high level EMB resistance in clinical isolates of *M. tuberculosis* from North India.

6. Expression of mycolic acids in pulmonary and extra-pulmonary clinical isolates of *Mycobacterium tuberculosis* under surface stress

Tuberculous lymphadenopathy is a diagnostic and therapeutic challenge as it mimics other pathologic processes. Additionally, it is still not clear why *M. tuberculosis* causes pulmonary tuberculosis (PTB) in some individuals and extra pulmonary TB in others. The present study analyzed the mycolic acid expression in clinical isolates of *M. tuberculosis* from PTB and lymph node TB (LNTB) to obtain an insight into these differential disease manifestations.

A total of 247 M. tuberculosis PTB and 13 LNTB clinical isolates were collected. All the isolates were confirmed to be *M. tuberculosis* by biochemical tests and PCR restriction analysis. Drug susceptibility testing to isoniazid, rifampicin, streptomycin and ethambutol was performed by proportion method. *M. tuberculosis* H37Rv and clinical isolates were exposed to surface stress (0.05% SDS containing broth). The mycolic acid content was analyzed by thin layer chromatography (TLC). Expression of mycolic acid synthesis genes was tested by real-time PCR using the housekeeping gene sigA.

Of the 20 drug sensitive *M. tuberculosis* clinical isolates including 10 PTB and 10 LNTB isolates selected for the study, the expression of α-mycolic acid during exposure to SDS was high in six isolates of PTB and seven isolates of LNTB. Methoxy mycolic acid showed an increased expression in five PTB isolates and seven LNTB isolates, whereas, ketomycolic acid showed increased expression in only three PTB isolates as against eight LNTB isolates. fas gene was upregulated in three PTB isolates and six LNTB *M. tuberculosis* isolates. inhA and pks13 showed similar expression in PTB and LNTB isolates.

Thus, during surface stress, all three mycolic acid components were expressed in more number of LNTB isolates than PTB isolates. In correlation with this, fas was upregulated more in LNTB isolates than PTB *in-vitro.* LNTB isolates may be programmed to respond to the harsh environment arising due to surface stress better than PTB isolates

7. Lack of association of novel mutation *aftB* D397G with ethambutol resistance in clinical isolates of *Mycobacterium tuberculosis* reveals the necessity of genotyping

The present molecular diagnostic assays for ethambutol (EMB) resistance only include polymorphisms at *embB306* which accounts for 40-60% of EMB resistance found globally. In order to find additional genotypic indicators for EMB resistance, polymorphisms were studied in arabinofuranosyl transferase encoding genes *aftA* (Rv3792), *aftB* (Rv3805) and *aftC* (Rv2673) in addition to the *embCAB* operon in 28 EMB resistant and 30 EMB susceptible isolates from India using Sanger sequencing and Illumina whole genome sequencing. The results

were further correlated with the minimum inhibitory concentration (MIC) and the effect of the non-synonymous polymorphism D397G in *aftB* on MIC was analysed by an over-expression approach.

The polymorphism D397G in *aftB* was found in 7/28 (25%) EMB resistant strains and 1/30 (3.3%) EMB sensitive isolates, while no significant mutations were observed in *aftA* or *aftC*.

Though all the isolates with the *aftB* D397G mutation also carried an *embB306* mutation (6/7; 85.7%) or an *embB402* mutation (1/7; 14.3%), the association of the D397G polymorphism with EMB resistance was found to be statistically significant by SNP analysis (p=0.0232, Fischer exact test). Interestingly, 5/7 (71.4%) of the isolates with the D397G mutation had high-level EMB resistance (MIC≥ 16ug/ml), 1/7 (14.3%) had low level resistance to EMB (MIC 4ug/ml), while MIC was not available for one isolate. Overexpression of the mutant *aftB* in H37Rv did not exhibit any change in the MIC. Whole genome sequencing of a panel of isolates confirmed the results of sequencing and also revealed that the mutation D397G at *aftB* was associated with only the Beijing genotype in a clonally diverse population of *M. tuberculosis* isolates.

Hence, though *aftB* D397G mutation was found to be significantly more in high level EMB resistant *M. tuberculosis* isolates than EMB susceptible isolates, overexpression analysis and genotyping by whole genome sequencing revealed that the mutation was not associated with EMB resistance and was instead a phylogenetic marker for Beijing isolates. The study also highlights the use of whole genome sequencing to identify the role of novel mutations in *M. tuberculosis* isolates in a high burden country.

8. A comparison of phenotypic method of drug susceptibility profiling of *Mycobacterium tuberculosis* with sloppy molecular beacon assay

Inadequate case detection is one of the primary impediments to control of tuberculosis. The HIV pandemic and worldwide increase in drug resistant tuberculosis highlights the need for improved diagnostic tools. Delay in diagnosis results in late initiation of anti-tubercular therapy and prolonged transmission of infection. Until recently, the diagnosis of tuberculosis was based on clinical features, radiological examinations, immunological tests, microscopic identification, or *in vitro* cultures. Acid-fast staining of specimens combined with isolation and culture of the bacilli remains the "gold standard" method to specifically identify mycobacteria. However, because of the slow growth rate of *M. tuberculosis,* this method is time-consuming, and the diagnosis can take up to 8 weeks.

Molecular methods have been increasingly incorporated in laboratories, particularly for the detection of drug resistant isolates and for the diagnosis of diseases due to fastidious and slow growing organisms. The advent of Xpert MTB/RIF and Line probe assay in routine diagnostic laboratories has brought about a paradigm shift in diagnosis of tuberculosis. We report the use of sloppy molecular assay to detect rifampicin resistance in isolates of *M. tuberculosis* obtained from patients of pulmonary tuberculosis.

Well characterized 40 clinical isolates of *M. tuberculosis* were obtained from the Department of Microbiology of the Institute. The clinical isolates were subjected to Phenotypic Drug Susceptibility testing (PDST) by 1% Proportion method followed by sloppy molecular beacon assay (SMB assay) targeting the rifampicin resistance determining region (RRDR). Resistant mutants were selected on the basis of Tm (melting temperature) shift.

The assay was highly sensitive (100%) and specific (100%) in detecting rifampicin resistance associated mutations at the *rpoB* locus in culture isolates of *M. tuberculosis.* However, molecular assays would have to be made economically feasible for low resource countries to be able to make an impact in therapy and control of tuberculosis.

9. High terbinafine resistance in trichophyton interdigitale isolates in Delhi, India harbouring mutations in the squalene epoxidase gene

In the last few years, infections caused by dermatophytes along with a concomitant increase in the number of difficult to treat cases have increasingly been recognised, indicating that dermatophytosis remains a challenging public health problem. The majority of infections are caused by *Trichophyton rubrum* and *Trichophyton mentagrophytes* complex. Terbinafine, (TRB) an allylamine antifungal used orally and topically is considered to be a first-line drug in the therapy of dermatophyte infections. Terbinafine resistance has been predominately attributed to point mutations in the *squalene epoxidase* (*SQLE*) target gene a key enzyme in the ergosterol biosynthetic

pathway leading to single amino acid substitutions. A total of 67 *Trichophyton* isolates obtained from individual patients of tinea cruris/corporis in three hospitals in Delhi, India, were analysed. Molecular identification of isolates was performed by sequencing the internal transcribed spacer (ITS) region of the small subunit ribosomal deoxyribonucleic acid (rDNA). Antifungal susceptibility testing (AFST) was carried out using the Clinical and Laboratory Standards Institute broth microdilution method (CLSI-BMD), using the M38-A2 guidelines. ITS region sequencing identified 94% (n = 63) isolates as *T. interdigitale*, two as *T. rubrum* and single isolates each of *T. tonsurans* and *T. violaceum.* Notably, 32% (n = 20) of *T. interdigitale* (n = 63) isolates had high MICs against TRB (MICs: 4 to ≥32 μg/mL), whereas the remaining 43 *T. interdigitale* isolates had low MICs 0.125-2 μg/mL. Among triazoles, fluconazole (FLU) showed reduced susceptibility (GM: 16.7 μg/mL) against *T. interdigitale* and 48% (n = 30) of isolates were resistant (MIC range: 32 to ≥64 μg/mL). However, voriconazole (VRC; GM MIC: 0.32 μg/mL) and itraconazole (ITC; GM MIC: 0.51 μg/mL) showed good activity. Furthermore, 21% (n = 13) and 11% (n = 7) isolates of *T. interdigitale* had high MICs of ITC (MIC ≥2 μg/ mL) and VRC (MIC ≥2 μg/mL), respectively. Notably, five (8%) isolates were multi-triazole resistant including FLU (MIC ≥64 μg/mL), VRC (MIC ≥2 μg/mL), and ITC (MIC ≥2 μg/mL). Overall, among imidazoles luliconazole (LUZ) showed excellent activity (GM MIC: 0.014 μg/mL) against all T. interdigitale isolates. Twenty terbinafine-resistant *T. interdigitale* isolates exhibiting elevated MICs (4 to ≥32 μg/mL) to terbinafine harboured single-point mutations Leu393Phe or Phe397Leu in the SQLE gene. In 12 (60%) *T. interdigitale* isolates, the Phe397Leu substitution was observed, whereas in the remaining 8 (40%) isolates the substitution Leu393Phe was reported for the first time in *T. interdigitale*. Furthermore, 10 susceptible *T. interdigitale* isolates (0.125-2 μg/mL) had a wild-type genotype. Remarkably, considerably high terbinafine resistance rate of 32% was observed among 63 *T. interdigitale* isolates. This high level of terbinafine resistance of Indian dermatophyte isolates is worrisome warranting antifungal susceptibility testing and mutation analysis for monitoring this emerging resistance.

10. Investigation of multiple resistance mechanisms in voriconazole-resistant *Aspergillus flavus* clinical isolates from a chest hospital surveillance in Delhi, India

Invasive and allergic infections by *Aspergillus flavus* are more common in tropical and subtropical countries. After *Aspergillus fumigatus, A. flavus* is the leading cause of invasive and allergic aspergillosis, particularly in infections of the respiratory tract, skin, mucosae, and eyes. Also, the true burden of azole resistance in *A. flavus* has not yet been fully explored, as antifungal susceptibility testing (AFST) is not routinely performed in many centers in the world. Furthermore, the underlying molecular mechanism of azole resistance in this filamentous mold is yet to be elucidated. In contrast to the case with *A. fumigatus*, in the last 5 years only a few sporadic reports documenting voriconazole resistance in *A. flavus* (VRC-RAfla) isolates have been recorded. The emergence of voriconazole (VRC) resistance in *A. flavus* impacts the management of aspergillosis, as azoles are used as the first-line and empirical therapy. We investigated azole resistance in a set of 120 clinical *A. flavus* isolates which originated from sinonasal and respiratory tract specimens. Further, using whole-genome sequencing (WGS), alterations in azole target genes (cyp51A, cyp51B, and cyp51C) were determined and the expression profiles of these genes and transporter genes, i.e., *MDR1, MDR2, mfs1,* and *atrF,* in non-wild-type (non-WT) *A. flavus* isolates exhibiting elevated MICs for VRC and other azoles were evaluated. Overall, 2.5% (n = 3/120) of *A. flavus* isolates had VRC MICs above epidemiological cutoff values (>1 μg/ml). The whole-genome sequence analysis of three non-wild-type (WT) *A. flavus* isolates with high VRC MICs showed polymorphisms in azole target genes (*cyp51A, cyp51B,* and *cyp51C*). Further, four novel substitutions (S196F, A324P, N423D, and V465M) encoded in the cyp51C gene were found in a single non-WT isolate which also exhibited overexpression of cyp51 (cyp51A, -B, and -C) genes and transporter genes, namely, *MDR1, MDR2, atrF,* and *mfs1.* The homology model of the non-WT isolate suggests that substitutions S196F and N423D exhibited major structural and functional effects on cyp51C drug binding. The substrate (drug) may not be able to bind to binding pocket due to changes in the pocket size or closing down or narrowing of cavities in drug entry channels. Notably, the remaining two VRC-resistant *A. flavus* isolates, including the one which had a pan-azole resistance phenotype (itraconazole and posaconazole), did not show upregulation of any of the analyzed target genes. These results suggest that multiple target genes and mechanisms could simultaneously contribute to azole resistance in *A. flavus.*

11. Environmental distribution of *Cryptococcus* species and some other yeast-like fungi in India

The basidiomycetous genus *Cryptococcus* comprises more than 100 species of non-fermentative, budding and encapsulated yeasts, but after thorough taxonomic revision it comprises now only ten species. It included two

important human pathogens, the *Cryptococcus neoformans* and *Cryptococcus gattii* species complexes. The former occurs globally in desiccated excreta of pigeons or other avian species, as also in decayed wood inside trunk hollows of numerous tree species. On the other hand, *C. gattii* has been largely reported from decayed wood in trunk hollows of various trees in tropical and subtropical regions. Apart from *C. neoformans* and *C. gattii,* about 38 sibling species have been globally reported from environmental sources, including the extremely cold region of Antarctica, high elevations in the Himalayas and saline waters of oceans. To investigate the environmental distribution of *Cryptococcus* species, especially, *C. neoformans* and *C. gattii,* and to characterize their mating types and genotypes we studied 611 samples, comprising 377 decayed wood of trunk hollows of various trees, 121 soil and 113 avian excreta. The sampling was largely done in Union Territory of Delhi (n=222; 36.3%), followed by West Bengal (n=110; 18%), Rajasthan (n=70; 11.5%), Tamil Nadu (n=62; 10.1%), Sikkim (n=50; 8.2%), Uttarakhand (n=49; 8.0%), Andhra Pradesh (n=19; 3.1%), Maharashtra (n=17; 2.8%) and Bihar (n=12; 2.0%). The study revealed environmental distribution of occurrence of *Cryptococcus neoformans* and *C. gattii* in 9% and 3%, respectively, of 611 samples investigated. *C. neoformans* showed the highest isolation frequency from tree trunk hollows in Delhi (31%), whereas *C. gattii* occurred in 12% of the samples in Delhi and 5% in Rajasthan. All of the *C. neoformans* and *C. gattii* isolates were subjected to molecular identification and genotypic determination based on M13 PCR fingerprinting and orotidine monophosphate pyrophosphorylase (URA5) PCR restriction fragment length polymorphism (RFLP). Further, DNA of non-neoformans/gattii *Cryptococcus* species and other yeast-like fungi was subjected to standard molecular identification by sequencing of partial internal transcribed spacer (ITS) region of rRNA gene and D1/D2 region. *Cryptococcus laurentii (=Papiliotrema laurentii), C. rajasthanensis (=Papiliotrema rajasthanensis), C. podzolicus (=Saitozyma podzolica)* and *C. flavescens (=Papiliotrema flavescens)* occurred in 0.5% each. The recovery of *C. flavescens* and *C. podzolicus* was new findings for India. One more noteworthy finding was isolation of a new yeast, recently classified as *Saitozyma cassiae* sp. Novo. The previous strain of this yeast came from tree bark debris in South India. Our isolates came from decayed wood inside a trunk hollow of an Acacia tree in, Bharatpur Bird Sanctuary, Rajasthan. The isolations of novel strains of *Cutaneotrichosporon moniliiforme* from decayed wood of a Pinus tree was another significant finding. Phenotypically, they differed from *T. moniliforme* by being encapsulated cells, had melanin-like pigment production and were unable to assimilate d-manitol and d-melezitose. AFLP analysis showed a distinctive banding profile vis-a-vis the reference strains of *T. moniliiforme* and *Cryptotrichosporon anacardii.* To conclude, further environmental studies are warranted, focusing on extensive sampling from temperate and other climatic regions not adequately covered by the present investigation. This may reveal the existence of new yeast genera or species, some of which may be potential pathogens.

12. Whole genome-based amplified fragment length polymorphism analysis reveals genetic diversity in *Candida africana*

Among the different fungal species infecting humans, those belonging to the *Candida* clade remain the most common cause of opportunistic mycoses and *Candida albicans* is undoubtedly the most frequently encountered clinically important species. *Candida africana* was isolated, for the first time, in 1993 in Madagascar and Angola, Africa and afterward proposed as new *Candida* species phylogenetically closely related to the well-known human pathogen *C. albicans*. However, currently *C. africana* is known as a biovariant of *C. albicans* with an exceptional capacity to colonize human genitalia and cause mainly vaginal infections. We investigated the genetic diversity of a panel of 26 *Candida africana* strains recovered from vaginal samples in different countries. The ABC genotype was determined using the polymerase chain reaction (PCR)-based assay. For mating-type determination, three previously designed primer pairs were used to amplify specific regions within the MTLalpha1, MTLa1, and MTLa2 loci. All fungal strains were heterozygous at the mating-type-like locus and belonged to the genotype A of *Candida albicans.* Moreover, all examined *C. africana* strains lack N-acetylglucosamine assimilation and sequence analysis of the *HXK1* gene showed a distinctive polymorphism that impair the utilization of this amino sugar in this yeast. Multi-locus sequencing of seven housekeeping genes revealed a substantial genetic homogeneity among the strains, except for the *CaMPIb, SYA1* and *VPS13* loci which contributed significantly to the classification of our set of *C. africana* strains into six existing diploid sequence types. Amplified fragment length polymorphism fingerprint analysis yielded greater genotypic heterogeneity among the *C. africana* strains. Overall the data reported that in *C. africana* genetic diversity occurs and the existence of this intriguing group of *C. albicans* strains with specific phenotypes associated could be useful for future comparative studies in order to better understand the genetics and evolution of this important human pathogen.

13. Evaluation of antiviral activity of medicinal plant extracts against influenza a virus

Influenza viruses are respiratory pathogens of major concern globally, contributing to high rates of morbidity and mortality annually. The viruses continuously evolve through antigenic changes by passing the host's acquired immunity against them. Due to frequent antigenic and genetic changes, vaccines need to be formulated yearly and old vaccines are not effective against newly emerging viruses. Moreover, these vaccines have to be administered annually in order to prevent influenza. Hence, there is a growing need for developing new and effective chemotherapeutic agents to treat influenza. Natural products, derived from medicinal plants have shown to be of great value in preventing and or / ameliorating viral diseases in preclinical and clinical trials. The study aims at evaluating the antiviral efficacy of medicinal plant extracts, having expected antiviral activity for the development of an alternative and effective therapy against influenza A viruses. Western blot and immunofluorescence and real time result shows potential inhibition at 24 hr of time point in presence of *Trachyspermum ammi* and alteration of innate immune genes (IFN-β, IL-1β, IL10, TNF α) has also observed. This study is on continuation.

14. Synergistic effect of immune modulatory antimicrobial peptides in regulation of influenza A virus infection

The peptides are non-toxic molecules having wide applications. Peptides act as a key component of host immune modulatory mechanism in various infections. Peptide shows potent microbicidal effects in bacterial and fungal infections. Study suggests, some viral replication is also altered by these immune modulatory peptides. The proposed hypothesis involved antiviral strategies to combat influenza virus by antimicrobial peptides. Modulation of signalling pathways are the main area of interest. The aim of our study is to elucidate the mechanism of actions of antimicrobial peptides against Influenza A virus and also elucidate the expression of host immune defensive genes and pathways involved in this mechanism. The *in vitro* system shows significant inhibition by expression analysis in protein level. The expression of influenza viral protein PB1 and inhibition upon treatment with peptide was validated by western blot.

15. Study of innate immune mechanism through small molecules against influenza A virus replication

The small molecules are less-toxic and have wide applications in various fields. Molecules like small peptides, nanoparticles, natural and synthetic molecules may modulate host immune mechanism and have various microbicidal activities. Due to frequent antigenic drift and shift, vaccines don't provide long term immunity against influenza. Moreover, the existing drugs (Oseltamivir, Zanamivir) also possess significant side effects. Thus, using small molecules as inhibitory agent might be beneficial to combat its replication. This study will be beneficial in understanding the cross talk between TGF-β and Notch pathway and its modulation by small molecules (Suramin) during influenza A virus infection. Significance of the proposed study broadly involves checking the inhibition of influenza A virus replication. This study determines antiviral strategy and therapeutic approach against influenza A virus. The work might attribute towards future therapeutics in the field of antiviral studies.

The characterized small molecule possesses antiviral activity and modulation of innate immune genes (TNF-α, ISG-15, IFN-α) was observed in presence of the molecule upon viral replication.

16. Role of microRNA in pathogenesis of influenza virus infection

MicroRNA play an important role in gene regulation, Single microRNA may regulate multiple genes. We have studied the involvement of microRNA 155 and 141 in pathogenesis of influenza A virus infection. We have found that miR-155 and miR-141 directly involved in pathogenesis of influenza infection. Knockdown the expression of miR-155 decreases viral multiplication in virus infected cell. Similar findings are observed for miR-141. Knockdown of miR-141 inhibit viral replication. Expression of microRNA was analyzed by real time PCR. Transfection of mimic and inhibitor of microRNA was performed by lipofectamine 3000. This study is continue in our labotory.

17. Aptamer mRNA chimera – the next generation vaccine

Aim of current study is to perform aptamer mediated delivery of antigenic mRNA to dendritic cells which may prime the dendritic cells with the antigen and following the antigen presentation it may provide protection against subsequent infection. Below are the experiments performed so far to achieve the goal.

Dendritic cells (DC) generated on 7th day of culture were analyzed for the presence of common DC markers. Generated DCs were found positive for CD11c, CD80 and CD86 in immunofluorescence microscopy. The presence of CD11c marker was confirmed by flow cytometry. Activation of DC upon influenza virus stimulus (in vitro) was observed as increase in size of dendrites. Above observations depict that progenitor cells were differentiated into dendritic cells.

The successful cloning of GFP and NP was observed by double digestion, correct sequence and coding frame was validated by sanger sequencing. mRNA of GFP and NP generated by in vitro transcription from the respective clones was transfected to HEK-293 cell lines. Native RNA is less stable; hence we tested to incorporate pseudouridine and 5-methylcytosine in the mRNA and found it more stable then native. Messenger RNA bearing modified nucleotides (pseudouridine and 5-methylcytosine) retains translational ability as evident by its expression in the transfected cells. Aptamer was ligated to the 3'-end of NP and GFP mRNA and confirmed by formaldehyde gel electrophoresis for ligated RNA.

18. UPR and autophagy crosstalk: potential antiviral strategy against chikungunya virus

Chikungunya virus is an Alphavirus transmitted to humans through arthropods bites. Chikungunya virus is a positive ssRNA virus consisting of nine genes encoding for four non-structural polyprotein i.e. nsP1, nsP2, nsP3 and nsP4 proteins and five structural polyprotein i.e. Capsid, E3, 6K, E2 and E1 proteins. Most RNA virus infection lead to induction of various signaling cascades that is associated with pathogenesis of virus. One such pathway is UPR pathway that restores ER homeostasis, however various viruses modulate these pathways and exploit them for their own replication. Viral infections overload the ER lumen by production of viral encoded protein, which may leads to the activation of UPR response. UPR alleviates ER stress by initiating signaling cascade mediated by three ER-resident transmembrane proteins: the IRE1 kinase, PERK kinase and the activating transcription factor ATF6. UPR also induces autophagy in an attempt to reduce ER stress from an accumulation of unfolded or misfolded proteins which cannot be degraded by the proteasome. Autophagy is a catabolic process that is important for maintaining cellular homeostasis by removing excess or damaged cellular organelles as well as long-lived and aggregated proteins. In the current study we analyzed the activation of various branches of UPR pathways and autophagy on chikungunya infection. We observed that chikungunya virus activates UPR pathways in time-dependent manner, with ATF6 pathway being activated during early infection, IRE1 pathway during intermediate stages of infection and PERK pathway during the late stages of infection.

19. High terbinafine resistance in Trichophyton interdigitale isolates in Delhi, India harbouring mutations in the squalene epoxidase gene

In the last few years, infections caused by dermatophytes along with a concomitant increase in the number of difficult to treat cases have increasingly been recognised, indicating that dermatophytosis remains a challenging public health problem. The majority of infections are caused by *Trichophyton rubrum* and *Trichophyton mentagrophytes* complex. Terbinafine, (TRB) an allylamine antifungal used orally and topically is considered to be a first-line drug in the therapy of dermatophyte infections. Terbinafine resistance has been predominately attributed to point mutations in the *squalene epoxidase* (SQLE) target gene a key enzyme in the ergosterol biosynthetic pathway leading to single amino acid substitutions. A total of 67 *Trichophyton* isolates obtained from individual patients of tinea cruris/corporis in three hospitals in Delhi, India, were analysed. Molecular identification of isolates was performed by sequencing the internal transcribed spacer (ITS) region of the small subunit ribosomal deoxyribonucleic acid (rDNA). Antifungal susceptibility testing (AFST) was carried out using the Clinical and Laboratory Standards Institute broth microdilution method (CLSI-BMD), using the M38-A2 guidelines. ITS region sequencing identified 94% (n = 63) isolates as *T. interdigitale,* two as *T. rubrum* and single isolates each of *T. tonsurans* and *T. violaceum.* Notably, 32% (n = 20) of *T. interdigitale* (n = 63) isolates had high MICs against TRB (MICs: 4 to ≥32 μg/mL), whereas the remaining 43 *T. interdigitale* isolates had low MICs 0.125-2 μg/mL. Among triazoles, fluconazole (FLU) showed reduced susceptibility (GM: 16.7 μg/mL) against *T. interdigitale* and 48% (n = 30) of isolates were resistant (MIC range: 32 to ≥64 μg/mL). However, voriconazole (VRC; GM MIC: 0.32 μg/mL) and itraconazole (ITC; GM MIC: 0.51 μg/mL) showed good activity. Furthermore, 21% (n = 13) and 11% (n = 7) isolates of *T. interdigitale* had high MICs of ITC (MIC ≥2 μg/ mL) and VRC (MIC ≥2 μg/mL), respectively. Notably, five (8%) isolates were multi-triazole resistant including FLU (MIC ≥64 μg/mL), VRC (MIC ≥2 μg/mL), and ITC (MIC ≥2 μg/mL). Overall, among imidazoles luliconazole (LUZ) showed excellent activity (GM MIC: 0.014 μg/mL) against all *T. interdigitale*

isolates. Twenty terbinafine-resistant *T. interdigitale* isolates exhibiting elevated MICs (4 to ≥32 μg/mL) to terbinafine harboured single-point mutations Leu393Phe or Phe397Leu in the *SQLE* gene. In 12 (60%) *T. interdigitale* isolates, the Phe397Leu substitution was observed, whereas in the remaining 8 (40%) isolates the substitution Leu393Phe was reported for the first time in *T. interdigitale.* Furthermore, 10 susceptible *T. interdigitale* isolates (0.125-2 μg/mL) had a wild-type genotype. Remarkably, considerably high terbinafine resistance rate of 32% was observed among 63 *T. interdigitale* isolates. This high level of terbinafine resistance of Indian dermatophyte isolates is worrisome warranting antifungal susceptibility testing and mutation analysis for monitoring this emerging resistance.

Pathology

Research

1. EGFR and KRAS mutations analysis of lung cancer patients

Lung cancer is characterized by the multistep accumulation of multiple genetic and/or epigenetic alterations that result in the activation of oncogenes and the inactivation of tumour suppressor genes. The new pathologic classification of lung cancer (Travis WD, 2013) has emphasized the importance of use molecular testing in stratifying patients for specific therapies and the role of personalized medicine for patients with lung cancer. It recommends that all patients with advanced lung adenocarcinoma should be tested for mutations such as epidermal growth factor receptor (EGFR), anaplastic lymphoma kinase (ALK) fusion oncogene etc. The epidermal growth factor receptor is overexpressed in 40-80% of non small cell lung carcinomas (NSCLC) and is a promising translational therapeutic target. Recent studies indicate that KRAS mutation is common in NSCLC, occurring in 20% to 25% of cases. Approximately 97% of KRAS mutations in NSCLCs involve codon 12 or 13. KRAS mutations are associated with resistance to EGFR tyrosine kinase inhibitors (TKIs); gefitinib, and erlotinib.

Total 170 cases of lung cancer presented to VPCI have been assessed to date. These included 139 males and 31 females. Age ranged from 18 to 85 years. Of these 95 patients have been analyzed for the presence of EGFR mutations using allele specific real time PCR assay and 36 patients were assessed for KRAS mutations in Codon 12. For EGFR mutations, DNA was isolated from the following samples (n=156): BA-2, ET-1, Blood-70, Sputum-43, FNAC-18, TBLB-21, pleural fluid-1. Positive EGFR mutations were identified in 65/156 (41.67%) samples; BA-0/2, ET-1/1, Blood-32/70, Sputum-11/43, FNAC-8/18, TBLB-12/21, pleural fluid-1/1. EGFR mutations associated with TKI sensitivity and resistance (substitutions in G719X, L858R, deletions in exon 19 and T790M, S768I respectively) were identified. The EGFR mutations were more frequent in Male patients and smokers. These included T790M (20/65, 30.77%), S768i (11/65, 16.92%), Insertion on exon 20 (12/65, 18.46%), G719x (30/65, 46.15%), Del19 (11/65, 16.92%), L858R (12/65, 18.46%), L861Q (13/65, 20.0%). EGFR-TKI sensitive mutation was most commonly identified in codon 719, followed by Del 19 and L858 R (46.15 %, 16.92% and 18.46 % respectively). EGFR-TKI resistant mutations that were identified included- T790M mutations in 30.77% cases, Insertions in Exon 20 in 18.46% and S768I in 16.92%. EGFR mutations were detected in both the blood and tissue samples of advanced lung cancer patients by this technique. Circulating blood was found to contain tumor DNA in 32/70, 45.71% cases. This DNA is either spontaneously released into the bloodstream by cells from the primary cancer site, metastases, or circulating tumor cells or by release of DNA from macrophages after they engulf apoptotic and necrotic cells. The circulating DNA carries tumor-related genetic and epigenetic alterations that is useful to study cancer development, progression, and resistance to therapy.

Total 36 cases EGFR negative cases were assessed for KRAS mutations in Codon 12. These included two (5.56%) were women and 34 (94.44%) were men; the samples assessed for KRAS mutations included; Blood-16, Sputum-14, FNAC-2, TBLB-3, Pleural fluid-1. All the patients samples were KRAS negative. Correlation between clinical data and KRAS mutation status revealed that the KRAS mutations were absent in both smokers as well as in non smokers. Cancer stage was also found to be unrelated to negative expression for KRAS mutation. Several factors may have contributed to the low mutant proportion. DNA of inflammatory cells around the tumor could have diluted tumor DNA. Tumor volume may have been diminished on serial sections of paraffin block. In addition, tumor heterogeneity may be present. Lung cancer is the major cause of death from neoplastic disease in the world. The development of molecular pathology into early lung cancer detection and personalized therapy is needed to provide a way forward.

2. Lung aberrant collagen deposition and its regulation by therapeutic agents

Idiopathic pulmonary fibrosis (IPF) is characterized by the relentless activation and proliferation of fibroblasts depositing type I collagen within the alveolar wall and obliterating the alveolar airspace. Collagen IV deposition in vascular and bronchial walls and in the interstitial space characterizes structural remodeling. Reversal of the aberrant collagen deposition has been demonstrated by agents such as N-acetylcysteine (NAC) (Shahzeidi, 1991).

In the present study we assessed the aberrant lung parenchymal collagen deposition on bleomycin injury and studied its response to sildenafil (phosphodiesterase-5 inhibitor) and Bosentan (Endothelin receptor antagonist) as compared to N-acetylcysteine therapy. The animals were divided into five groups, group I control (n=12), group II intra-tracheal bleomycin (n=12), group III bleomycin+bosentan (n=12), group IV Bleomycin + NAC (n=12), group V bleomycin + sildenafil (n=12). The animals were sacrificed at 7, 14 and 28 days after drug administration and the lung tissues were homogenised in PBS. Total lung collagen was estimated by performing hydroxyproline assay. Collagen deposition in lung tissue was assessed by Masson's Trichrome stain. Lung hydroxyproline levels are increased in the lung after bleomycin induced lung injury. They correlate with increased collagen deposition in lung parenchyma and an increased expression of antiproteases such as tissue inhibitors of proteases (TIMP-1) after bleomycin instillation. The antioxidant, N-acetylcysteine reduced the primary inflammatory events and lung parenchymal collagen deposition from day 7 onwards (111.6 ±8.2 μg/gm lung tissue, 3 mmol dose) and from day 14 onwards (128.7 ± 8.5 μg/gm lung tissue, 0.3 mmol dose) resulting in the attenuation of pulmonary fibrosis. Sildenafil reduced the collagen deposition from day 7 onwards, similar to NAC (3 mmol dose) but both these drugs did not reduce the deposition to baseline levels (74.28 ± 10.51 μg/gm lung tissue, Control group). Bosentan montherapy was most effective in reducing the collagen deposition from day 7 onwards and reached baseline levels on day 14 onwards (92.35 ± 6.85, 63.04 ± 1.5, 75.62 ± 6.09 respectively). Sildenafil and NAC are similarly effective in attenuating pulmonary fibrosis. The present study demonstrates the efficacy of bosentan monotherapy in reducing the collagen deposition caused by bleomycin instillation.

3. Transforming growth factor Beta-1 (TGF-β1) signalling pathway in the lungs and its regulation by Bosentan

Transforming growth factor beta (TGF-β) and its isoforms (TGF-β1,2,3) are pleiotropic profibrotic cytokines that play a critical role in the regulation of cell growth, differentiation. These regulate fibroblast proliferation, epithelial myoepithelial transition, ECM accumulation and influence wound healing. A number of lung cells including; alveolar macrophages, bronchial epithelial cells, fibroblasts and endothelial cells contribute to TGF-β1 synthesis. TGF-beta acts via specific receptors activating multiple intracellular pathways resulting in phosphorylation of receptor-regulated Smad2/3 proteins that associate with the common mediator, Smad4. The TGF complex translocates to the nucleus, binds to DNA and regulates transcription of many genes. Many actions of TGF-β appear to be mediated by endothelin-1 (ET-1) through both Smad-independent and Smad-dependent mechanisms. ET-1 has been suggested to be a downstream mediator of TGF-β responses and ET inhibition is likely to be of benefit in combating chronic pulmonary fibrosis. In the present study we hypothesized that targeting the ETA and ETB receptors on fibrotic lung fibroblasts can decrease profibrotic response in response to elevated TGF-β after bleomycin instillation.

TGF-β-1 mRNA and protein expression in the lungs was assessed after bleomycin instillation and after bosentan therapy (dual endothelin receptor antagonist). After bleomycin instillation, TGF-β1 cellular protein expression increased in alveolar epithelial cells, bronchial epithelial cells and interstitial macrophages and active TGF-β1 levels increased from day 7, onwards when compared to the control group. On day 14, significant increase in TGF-β1 mRNA expression was seen (Fold change of 6.2 on day 14). Bosentan treatment effectively reduced the TGF-β1mRNA (Fold Change of 0.44, 0.65 and 0.80 on days 7, 14 and 28 respectively) and protein expression in alveolar, bronchiolar and perivascular area with increasing days of treatment from day 7 onwards upto day 28. This correlated with attenuation of parenchymal and vascular remodeling and increased apoptosis of the fibroblasts. Conclusion: Bosentan inhibits ET-1 and reduces TGF-β1 driven profibrotic response in the lung, thereby proving to be effective in attenuating the pulmonary fibrosis caused by bleomycin.

4. The effect of N-acetylcysteine monotherapy on bFGF expression in bleomycin induced pulmonary fibrosis

The fibroblast growth factors (FGFs) are a family of heparin-binding profibrotic growth factors that exert their effect by stimulating the proliferation of fibroblasts and the migration of myofibroblasts during the remodelling processes. bFGF is a potent alveolar type II cell (AEC) mitogen and effectively induces lung epithelial cell-specific surfactant protein gene expression (SP-A,B,C) resulting in Type II AEC differentiation. bFGF in addition has pro-angiogenic effects by interacting with various endothelial cell surface receptors. Recent study has shown bFGF to have a protective role and to be essential for epithelial repair and maintaining epithelial integrity after bleomycin-induced lung injury in mice.

In the present study the bFGF mRNA and protein expression was assessed in bleomycin model of pulmonary fibrosis before and after NAC monotherapy. Lung bFGF mRNA progressively increased from day 7 to day 14

and day 28 (Fold change 2.75, 4.18 and 5.79, $p<0.01$ respectively) after bleomycin instillation. bFGF protein was mainly expressed by bronchial epithelial cells(BECs) and peribronchiolar and perivascular inflammatory cells on day 7. bFGF is liberated from storage sites by enzymatic activity following cell damage between days 7 and 14, as evidenced by significant increase in immunoreactivity for bFGF within the alveolar basement membrane. From day 7 to 28, parenchymal and vascular remodeling occurred concurrently and progressed significantly to grade-V fibrosis accompanied by significant VSMC hypertrophy.

N-acetyl-L-cysteine (NAC) is a derivative of cysteine with an acetyl group attached to the amino group of cyteine. NAC is essentially a prodrug that is converted to cysteine in the intestine and absorbed into the blood stream. Cysteine is the key constituent of glutathione and hence administration of NAC replenishes glutathione stores and helps mitigate symptoms caused by cellular oxidative damage. NAC treatment resulted in marked reduction of bFGF mRNA from day 7 onwards. NAC (0.3 mmol) reduced the bFGF mRNA to 0.832 ± 0.51, 0.65 ± 0.122, 1.39 ± 0.16 while NAC (3mmol) reduced the bFGF mRNA to 0.12 ± 0.008, 0.30 ± 0.03, 0.129 ± 0.05 on day 7, 14 and 28 respectively. This was associated with attenuation of the epithelial mesenchymal transition (EMT) in rat alveolar epithelial cells and resulted in improvement in parenchymal remodeling and reversal of fibrosis. The alveolar macrophages showed bFGF protein expression, with both the doses. These have previously been suggested to be the activated phagocytes generated to fight the oxidative stimuli, including DAMPs, cytokines and fibrous material through membrane-bound NADPH oxidase, referred to as the respiratory burst.

The significance of elaborating supportive evidence for the use of N-acetylcysteine (NAC) as a monotherapy has arisen after two recent trials proved the previously commonly used triple drug regimen, combining treatment with prednisone, azathioprine, and NAC to be harmful or at least ineffective in patients with IPF. In the present study we demonstrate NAC monotherapy to be effective in attenuating parenchymal remodeling by reducing the elevated bFGF levels in the lung.

5. Macrophage influx and CD-68 antibody expression in bleomycin induced lung fibrosis

Macrophages are crucial regulators of inflammation and fibrosis that are found in close proximity to collagen-producing myofibroblasts. In addition to their phagocytic capacity, the macrophages feature a number of innate immune receptors to detect pathogen-associated molecular patterns (PAMP; e.g., LPS and zymosan) and danger-associated molecular patterns (DAMP), which direct the secretion of inflammatory cytokines (e.g., TNF-α, IL-1, and IL-6). CD68 is a heavily glycosylated type I transmembrane glycoprotein which is mainly associated with endosomal/lysosomal compartment in macrophages. CD68 (LAMP-4) belongs to the lysosomal-associated membrane proteins (LAMPs) family. Its preferential location within late endosomes suggests its role in peptide transport/antigen processing. CD68 antibody plays a role in phagocytic activities of tissue macrophages, both in intracellular lysosomal metabolism and extracellular cell-cell and cell-pathogen interactions. It binds to tissue and organ-specific lectins or selectins, allowing homing of macrophage subsets to particular sites. To examine whether CD68 might contribute to inflammatory response, the CD68 expression of the alveolar and interstitial macrophages was assessed in response to release of DAMPs such as hemoxygenase-1 after bleomycin injury before and after treatment with N-acetylcysteine was assessed using CD68 antibody (ab125212).

After bleomycin instillation, cellular injury releases the DAMPs, such as heat shock proteins (HO-1) extracellularly and induces the recruitment, activation and the release of proinflammatory cytokines by monocytes and macrophages. Hemoxygenase-1(HO-1) expression is seen in the alveolar epithelial cells, alveolar macrophages and endothelial cells, from day 7 onwards. This correlated with an increased influx of interstitial macrophages in lung parenchyma from day 7, that further increases on day 14 and persists upto day 28 (6.5 ± 0.40, 11.7 ± 0.88, 10.10 ± 1.02 cells/hpf respectively). The macrophages undergo activation to reach a mature functional phenotype with enhanced CD68 expression. From Day 7 onwards, CD68/scavenger receptor type D (SCARD) is significantly upregulated in macrophages in response to bleomycin stimuli and binds to phosphatidylserine, apoptotic cells etc. These activated macrophages in turn secrete pro-fibrotic soluble mediators such as TNF-α and TGF-β. They are further involved in ECM processing through secretion of matrix metalloproteases. NAC therapy resulted in significant reduction of macrophage influx on day 14 and day 28 with 3 mmol and 0.3 mmol dose respectively (5.1 ± 0.34, 6.3 ± 0.30, 6.7 ± 1.01) (5.6 ± 0.163, 7.3 ± 0.47, 6.7 ± 1.01). Higher dose (3 mmol) NAC therapy more efficiently reduced the macrophage influx when compared to lower dose (0.3 mmol). The CD68 expression by the persisting macrophages in bleomycin instilled animals, before and after treatment with NAC (3 mmol/L and 0.3 mmol/L) remained

significantly unchanged. An associated reduction in the HO-1 expression in the alveolar epithelial cells and alveolar macrophages is seen while a paradoxical elevation of HO-1 expression was observed in the endothelial cells. Thus the activated macrophages and its lysosomal membrane protein (CD-68) regulate the fibrotic response to DAMPS released by injured lung cells and demonstrate their potential as a novel target for therapeutic intervention. NAC therapy reduces, inflammatory infiltration and cellular damage, leading to reduction in macrophage recruitment in lung interstitium resulting in attenuation of lung fibrosis. In this resolution phase, the CD 68 lysosomal protein act as scavenger receptor (ScR) of macrophages and helps in the clearance of cytotoxic molecules, and dead cells. Once the proinflammatory potential of the macrophage is deactivated, it undergoes functional changes that allow it to clear debris and express general repair functions. IL-10, TGF-β, and a multitude of anti-inflammatory mediators such as nucleotides, lipoxins, and glucocorticoids play a role in resolution. Previously the $CD68^{-/-}$ mononuclear phagocytes have exhibited a trend toward enhanced antigen presentation to $CD4^{+}$ T-cells, raising the possibility that CD68 may function either to negatively regulate antigen uptake, loading, or major histocompatibility complex class II (MHC-II) trafficking. In summary, the role of CD68 and macrophages in inflammation and immunity is still mysterious and remains to be elaborated. Understanding the lung macrophage origins, biology, and phenotypes can be used to develop novel macrophage-orientated biomarkers for disease diagnosis and potential targets for future anti-fibrotic therapies.

6. Liquid biopsy in lung cancer: molecular assessment of circulating tumor DNA (ctDNA)

Lung cancer is the leading cause of cancer death worldwide, with non-small cell lung cancer (NSCLC) accounting for the majority of cases. Recent advances in the understanding of the biology of tumors and advancements in highly sensitive detection technologies for molecular analysis have resulted in targeted therapies, such as epidermal growth factor receptor (EGFR) tyrosine kinase inhibitors. However, the understanding of an individual patient's lung cancer is often limited by tumor accessibility because of the high risk and invasive nature of current tissue biopsy procedures. Liquid biopsy is the analysis of circulating biomarkers from peripheral blood, such as circulating tumor cells (CTCs) and circulating tumor DNA (ctDNA). It offers a new source of cancer-derived materials that may reflect the status of the disease better and thereby contribute to more personalized treatment.

In the first phase of this study, we are examining the clinical significance of isolation of ctDNA from peripheral blood of NSCLC patients, using molecular detection technologies, such as Sanger sequencing with MicroVariant Finder. Sanger sequencing for EGFR mutations in Exons 18, 19, 20, 21 has been performed on 31/170 cases and 31 controls. Samples assessed include peripheral blood (30/31 cases, 31/31 Controls), FNAC (1/31), including 29 males and 2 females. 20/31 cases were positive by qRT-PCR for EGFR mutation and 11/31 cases were negative for EGFR mutation on qRT-PCR. Currently, molecular assessment of most patients with NSCLC is conducted on tissue biopsy for targeted therapy. The invasive nature of tissue biopsy is an obstacle to the frequent sampling that is needed to better understand tumor dynamics and drug response. In addition, local sampling by tissue biopsy can be biased because of the heterogeneity of tumors and failure to detect the occurrence of metastasis at distant sites. Less invasive "liquid biopsy" is therefore advantageous as it can provide insight into the real-time dynamics of lung cancer via more frequent analysis of circulating tumor DNA (ctDNA). It is useful in targeted therapies where the development of resistance is almost inevitable and requires reassessment of the molecular profile. Furthermore, liquid biopsy offers a more comprehensive picture of the disease, because markers circulating in blood may contain cancer-associated materials from multiple disease sites in the body. However, the extreme rarity of tumor-associated biomarkers in blood is a great challenge to achieving the goals desired of liquid biopsy and may further require next-generation sequencing (NGS) and droplet digital polymerase chain reaction (ddPCR) inorder to make liquid biopsy-based personalized medicine a reality in the near future.

7. Toll-like receptor 2 and 4 expression and NF-κB signalling during immunopathogenesis of bleomycin induced lung fibrosis

The functions of the extracellular matrix have evolved from the traditional concept of a static "glue" holding cells into tissues to the more sophisticated one of a dynamic biomaterial that provides strength and elasticity, as well as points of interactions with cell surface receptors, and availability of growth factors. The Toll-like receptors (TLRs) are pattern recognition receptors that regulate pulmonary fibrosis by sensing alveolar epithelial cell damage and bridging the host innate and adaptive immune responses. The matrix-derived hyaluronan (HA) fragments released after tissue injury act as endogenous ligands of Toll-like receptors 2 and 4 and determine the outcome as tissue repair

or fibrosis. Therefore in the present study we assessed the 35 kDa LMW HA fragments released after bleomycin injury, time course of activation of TLR-2,4 and downstream activation of NF-κB signaling and correlated with the development of parenchymal inflammation and fibrosis.

Male Wistar rats were divided into two groups: Group I (saline control, n=24) and Group II (intratracheal bleomycin, 7 U/kg/animal, n=24). Animals were euthanized on 0, 7, 14 and 28 days. TLR-2 & 4 mRNA and protein levels, 35 kDa LMW HA, NF-κBp65 levels, macrophage infiltration and CD68 expression were estimated at all time intervals. The results revealed a significant increase of 35 kDa LMW HA on day 7 after bleomycin injury that correlated with elevated TLR-4 mRNA levels. Persistence of TLR-2 and NF-κB signaling resulted in macrophage accumulation and progression of lung parenchymal remodeling. These results collectively indicate that the 35 kDa HA fragment activates the host innate immune response by the sequential upregulation of TLR-2,4, in a NF-κB dependent pathway. The subsequent parenchymal infiltration by macrophages results in aberrant parenchymal remodelling. The estimation of the 35 kDa LMW HA levels may prove to be a biomarker of active fibrotic lung disease. The TLRs and NF-κB signaling pathway are potential targets for the treatment of this debilitating disease.

8. miR-21-TGF-β1 pathway regulates bleomycin induced parenchymal remodelling

The aberrant expression of microRNAs has been associated with parenchymal remodeling associated with lung fibrosis. Previously we have demonstrated miR 21 to be upregulated in the bleomycin induced fibrosis in lungs of rats from day 14 to day 28. In the present study, the upregulation of miR 21 correlated with TGF-β1 expressed in the lung. This correlation was suggestive of the role of miR21 in an amplifying circuit to enhance fibrogenic activity of TGF-β1 in human primary fibroblast. A potential mechanism of miR-21 in enhancing fibrosis is through regulating the expression of the inhibitory Smad, Smad7. Inaddition miR-21 regulates fibroblast survival, basic fibroblast growth factor secretion and extent of interstitial fibrosis and cardiac hypertrophy via the ERK-MAP Kinase signaling pathway. The role of miR-21 in enhancing epithelial mesenchymal transition (EMT) of the alveolar epithelial cells remains to be elaborated. After bleomycin instillation, the miR-21-TGF-β1 signaling pathways are activated and promote EMT, by activating the mesenchymal genes such as Vimentin and α-SMA. The molecular mechanisms regulating pulmonary vascular and parenchymal remodeling are common. Therefore we postulated that Bosentan that is used for the treatment of pulmonary hypertension can attenuate pulmonary fibrosis by acting on the miR-21-TGF-β1 pathway. The efficacy of bosentan in reducing the elevated miR-21 levels after bleomycin instillation was assessed as monotherapy and in combination therapy with sildenafil. Bosentan monotherapy restored the levels of miR-21 to baseline on day 14 and significantly reduced miR-21 levels to below baseline levels on day 28 (1.32 ± 0.16, 1.32 ± 0.15, 0.54 ± 0.19) on days 7, 14 and 28 respectively. Bosentan treatment effectively reduced the TGF-β1mRNA and protein expression in alveolar, bronchiolar and perivascular area with increasing days of treatment from day 7 onwards upto day 28. Sildenafil+Bosentan_Combination therapy was effective in down-regulating miR-21 from day 14 onwards with the corresponding fold change of 2.5 ± 0.45, 1.7 ± 0.5, 1.6 ± 0.3, on days 7, 14 and 28 respectively. Overall, these data suggest that miR-21-TGF-β1 is a central mediator in the pathogenesis of lung fibrosis and a potential target for treating fibrotic diseases, including IPF. Bosentan monotherapy effectively restores the miR-21-TGF-β1 pathway and attenuates pulmonary fibrosis.

9. Role of insulin like growth factor axis in the bleomycin induced lung injury in rats

The insulin-like growth factor-I axis regulates cell proliferation in an autocrine/ paracrine way in idiopathic pulmonary fibrosis (IPF) and may play a significant role in pathogenesis of pulmonary fibrosis. In IPF patients, IGF-1 expression reduces in the later stages of the disease evidenced by a decrease in IGF-1 in the bronchoalveolar lavage fluid suggesting that an imbalance in the IGF axis may play a pivotal role in the progress of this disease. The purpose of the present study was to investigate whether a) an imbalance in the insulin growth factor (IGF) axis evidenced as changes in IGF binding protein 5 (IGBP5) and IGF-1 contributed to the phenotypic alterations of the alveolar type II epithelial cells, their transition to mesenchymal cells and extracellular matrix formation and b) restoration of the changes in IGBP5 and IGF-1 by the drug pioglitazone increased the survival of the alveolar type II epithelial cells and reduced the extent of lung injury by attenuating epithelial mesenchymal transition (EMT) and extracellular matrix formation. Male Wistar rats were divided into three Groups: Group I (saline control, n=30), Group II (Bleomycin, given as intratracheal instillation, 7 U/kg, n=24) and Group III (Bleomycin + Pioglitazone (40 mg/kg/day orally, starting 7 days post bleomycin, n=18). From lung tissues, the protein expressions of IGF-1, IGFBP-5, surfactant protein C (SP-C, as a marker for type II alveolar epithelial cells) and alpha smooth muscle

actin (α-SMA, as a marker for epithelial mesenchymal transition), were determined on days 7, 14, 21 and 35 post bleomycin in Group II and on days 7,14 and 28 post pioglitazone in Group III. In Group II, both IGFBP-5 as well as IGF-1 expressions were found to be reduced significantly in alveolar epithelial cells from day 7 till day 35 as compared to Group I. An increase in SP-C and α-SMA expression as well as their colocalisation was seen in the AECs undergoing EMT from day 7 onwards upto day 35. A concomitant remodeling and laying down of extracellular matrix was also observed. In Group III, there were significant increases in IGF-1 and IGFBP-5 expressions in the alveolar epithelial cells compared to Group II. Furthermore, there was a significant decrease in the solid area of fraction and extracellular matrix in the lung tissue. It is concluded that IGF 1 and IGFBP-5 play important roles in bleomycin induced lung injury by regulating alveolar epithelial cell survival, EMT and extracellular matrix formation. The reduction in the IGF-1 and IGFBP-5 expression in the AEC after bleomycin instillation prevented the regeneration of type1 cells and repair of parenchymal injury. The damaged AECII's undergo EMT and show SP-C and α-SMA co-localisation as well as an increasing expression from cellular to fibrotic phase which is associated with excess deposition of extracellular matrix. Pioglitazone attenuates the changes caused by bleomycin by restoring the IGF-axis balance.

10. Lethal-7 miR-fibroblast growth factor influence bleomycin induced lung injury

The flexible miRNA:mRNA binding is the basis on which microRNAs suppress their target genes and regulate various pathophysiological processes. One of the founding members of the miRNA family is lethal-7 (let-7), which plays many important roles in normal development and diseases. The let7a and let-7b miRNAs are ubiquitously-expressed. Let 7d has been shown to be downregulated in IPF patients and exert a profibrotic role. TGF downregulates Let7d and Smad3 binding to the Let-7d promoter has been demonstrated. In the present study, the miRs let-7d, Let7f, miR-93 and bFGF expressions were investigated following intratracheal bleomycin instillation. Male Wistar rats were divided into two groups: Group I (control instilled with saline, n=18) and Group II (bleomycin instillation, 7 IU/kg b.w, n=18). Animals were euthanized on day 7, 14 and 28 after bleomycin/saline instillation. Let-7d, Let7f, miR-93 and miR-21 using Qiagen miRNeasy mini kit and bFGF mRNA expression by qRT-PCR were determined at each time point. Lung pathology was assessed by morphometry. Immunohistochemistry was performed on tissue sections using the bFGF monoclonal antibody (Santacruz Biotechnology, USA, Sc-79, D0611) and Immuno Cruz ABC staining system (Santacruz Biotechnology, USA, Sc-2018). A progressive increase in bFGF expression from day 7 to day 28 as compared to control. On day 7, the vascular adventitial fibroblasts and peribronchiolar fibroblasts showed bFGF expression and proliferation. On day 14 the type II pneumocytes and showed bFGF expression in addition to peribronchiolar and perivascular fibroblasts. On day 28, bFGF expression was maximum in the interstitial macrophage and fibroblasts. In bleomycin instilled group, let-7d and miR-93 were down-regulated with fold change 0.4, 0.35 and 0.35 and Let-7f was up-regulated with fold change 1.5, 2 and 2.4 on days 7, 14 and 28 respectively. The corresponding bFGF mRNA expression was 3.7, 6.6, and 2.2 respectively. Morphometry revealed minimal interstitial inflammation on day 7. On day 14, the interstitial inflammation was maximal and associated with interstitial thickening and fibrosis without damage to lung architecture. On day 28, there was a progressive increase in fibrosis with definite damage to lung architecture. Bleomycin induced EMT in pulmonary fibrosis is associated with Inhibition of Let-7d, miR-93 and upregulation of Let -7f. This in turn releases the profibrotic cytokine bFGF resulting in increased collagen deposition and thickening of alveolar septa.

11. Immunohistochemistry of lung cancer and lung fibrosis

The histopathological heterogeneity and differentiation of lung carcinomas is well known to affect its therapeutic responsiveness and prognosis. Immunohistochemistry (IHC) is essentially required for categorization of poorly differentiated lung cancer cases as per the latest WHO classification of lung cancer. In accordance, the department has started the standardization and optimization of a panel of lung cancer antibodies using fully automated immunohistochemical analyser, Ventana Benchmark-GX since October 2015.

The IHC expression is being studied for: (1) Napsin, p63, TTF-1, CK-7, synaptophysin, Chromogranin-A, CD 45, SP-C etc in order to confirm the primary site of origin of lung tumor and its categorization; (2) the proliferating capability of the tumour cells is being assessed by studying the increase in cytoplasmic expression of proapoptotic marker, Caspase-3 etc.; (3) the tumour expression of molecular markers such as KRAS, ALK, EGFR mutations is being assessed for adjunct therapy; and (4) the metastatic potential of the cancer cells is being studied using VEGF-1, α-SMA, bFGF etc.

So far, IHC staining has been done on: (1) Lung biopsies (n=199) including transbronchial lung biopsy (TBLB), endobronchial lung biopsy (EBLB), fine needle aspiration biopsy (FNAB), tru-cut biopsy, cell block (pleural fluid, BALF, FNAB, sputum); (2) skin biopsy; and (3) experimental lung biopsy (n=501)

Immunohistochemical analysis of lung tissue remodeling has implication as prognostic markers for IPF. The cellular and biological interrelationships in lung fibrosis are being explored in an experimental model using an IHC panel inorder to understand the pathogenetic basis of lung fibrosis by assessing the: (i) growth factor markers (bFGF, TGF etc.); (ii) markers of epithelial mesenchymal transition (α-SMA, SP-C stc); (iii) matrix remodeling (MMP/TIMP; and (iv) angiogenesis (VEGF, FLK-1) etc.

Immunohistochemistry Panel For Lung Cancer	
Antibody	No of cases
Napsin	15
KRAS	12
Pan CK	17
TTF-1	35
Calretinin	9
WT-1	8
CK-20	15
CK-7	11
CEA	24
Synaptophysin	8
NSE	3
CD45	7
EGFR-	4
EGFR-L	10
CD-1a	4
S-100	4
Chromogranin	2
B-Actin	1
P63	4
CK5/6	3
ALK	1

Immunohistochemistry Panel For Lung Fibrosis	
bFGF	166
TLR-2	19
Caveolin-1	18
CD-68	29
Vimentin	17
VEGF	17
FLK-1	6
Caspase	25
TIMP-3	33
TGF-β	85
TIMP-1	46
FGF-R1	12
FGF-R2	12
MMP-8	22
Aquaporin	4
α-SMA	11
SP-C	16
HOX-1	13

Pharmacology

Research

1. To evaluate the effect of *Terminalia catappa* fruit and seed extract in streptozotocin induced diabetic retinopathy in rats

To evaluate the effect of *Terminalia catappa* fruit and seed extract in streptozotocin induced diabetic retinopathy in rats.

Streptozotocin-induced chronic diabetic rat model was used. Fourteen groups (n=8) control, diabetic control, standard anti-diabetic drug- glibenclamide (10mg/kg), hydro-alcoholic fruit and seed extract of *Terminalia catappa* in three doses each (20mg/kg, 30mg/kg and 40mg/kg), T. catappa fruit and seed extract 40mg/kg plus glibenclamide and perse groups were studied for 12 weeks. Drugs were given orally every day for 12 weeks. Blood glucose, body weight and urine volume were measured weekly. Lenticular images, fundus images and retinal vessels tortuosity was evaluated at 2^{nd}, 4^{th}, 6^{th}, 8^{th}, 10^{th} and 12^{th} week. Histological changes, glycosylated hemoglobin, inflammatory, angiogenic and oxidative biomarkers will be estimated at 12^{th} week.

Terminalia catappa fruit and seed extract have shown antihyperglycemic effect. Cataract lens grading observed in diabetic rats at 12^{th} week: diabetic control, grade 5; glibenclamide and T. catappa 20mg/kg, grade 2; 30mg/kg, grade 1 and with 40mg/kg lens and T. catappa and glibenclamide lens became clear, like control (grade 0) by eight and sixth week respectively. Hydro-alcoholic fruit and seed extract in all three doses significantly reduced ($p<0.01$) retinal vessels (arteriole and venule) tortuosity in diabetic rats. *Terminalia catappa* in all doses in diabetic rats showed modulatory effect in oxidative, angiogenic and inflammatory biomarkers.

Terminalia catappa fruit and seed extract reverses the diabetes-induced retinopathy. Hydro-alcoholic fruit extract has shown multiple actions - anti-hyperglycemic, anti-oxidant, anti-angiogenic and anti-inflammatory, therefore, has a potential to be used in diabetes-induced retinopathy.

2. Effect of Indian almond and sweet almond in diabetes induced nephropathy in rats

Adherence to medication is a big challenge for chronic diseases like diabetes. Uncontrolled diabetes mellitus leads to various serious complications such as retinopathy, neuropathy and nephropathy.

To evaluate the effect of Terminalia catappa (Indian almond) and Prunus amygdalus (Sweet almond) fruit extract in diabetes-induced nephropathy in rats.

Streptozotocin-induced chronic diabetic rat model for 12 weeks was used. Twelve groups (n=8) - control, diabetic control, hydro-alcoholic fruit extract of Indian almond and Sweet almond, and with standard antidiabetic drug, glibenclamide were studied. Drugs were given orally every day for 12 weeks. Blood glucose was measured weekly. Glycated hemoglobin; anti-oxidant and inflammatory markers; nephrotoxicity markers - serum creatinine, serum cystatin-C, blood urea nitrogen and total urinary protein were estimated at 12th week.

Hydro-alcoholic fruit extract of Terminalia catappa and Prunus amygdalus significantly decreased blood glucose ($p<0.001$) in dose-dependent manner in diabetic rats. Chronic diabetic model of 12 weeks produced DN as was evident by significant increase in serum creatinine, serum cystatin C, blood urea nitrogen and total urinary levels; significant increase in LPO, decrease in GSH, SOD and catalase, and significant increase in IL-1β and TNF-α levels. Fruit extract of T. catappa in all the three doses significantly reduced ($p<0.01$) nephrotoxic biomarkers. The levels of all the four oxidative biomarkers and inflammatory biomarker, TNF-α studied were comparable to values in control rats.

Terminalia catappa and Prunus amygdalus fruit extract has antihyperglycemic, antioxidant and anti-inflammatory activity and showed protective effect in diabetes-induced nephropathy in rat model.

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

Bronchial asthma is a chronic inflammatory disease of the airways characterized by airway inflammation, airflow obstruction, airway hyperresponsivness and airway remodeling. UNIM-352 is a polyherbal formulation used in Indian traditional medicine for the treatment of bronchial asthma. The present study evaluated the effects of UNIM-352 in experimental model of airway inflammation and remodeling, with an aim to elucidate the cellular and molecular mechanisms to validate its use in asthma.

The results showed that UNIM-352 attenuated the levels of TNF-alpha, IL-4, IgE, GM-CSF, IL-13 and TGF-beta, whereas histone deacetylase levels were elevated, as compared to the control group, in both blood and BAL fluid. Further, cytology of blood and BAL fluid revealed that UNIM-352 reduced the eosinophil and neutrophil counts, the effector cells in asthma. UNIM-352 also reduced the hydroxyproline content, an efficient marker of collagen production in lung tissue. In addition, UNIM-352 treated rats showed reduced degree of inflammation, goblet cell hyperplasia and subepithelial fibrosis, the important markers of remodeling on histopathological examination of lung tissues. UNIM-352 also attenuated 8-OHdG and 8-isoprostane levels in both body fluids, which suggested protective effect of UNIM-352 against reactive oxygen species and oxidative DNA damage. Further, the polyherbal agent reduced the bronchial hyperreactivity and airflow obstruction in response to methacholine exposure.

The results suggest anti-inflammatory, immunomodulatory, anti-remodeling, anti-oxidant and anti-spasmogenic mechanisms of UNIM-352 and this could contribute to its observed beneficial effects in bronchial asthma.

4. Studies on the anti-inflammatory and immunomodulatory effects of *Albizia lebbeck* and *Solanum xanthocarpum* in experimental models of bronchial asthma

The effects of *Albizia lebbeck* and *Solanum xanthocarpum* in experimental models of airway inflammation, bronchial hyperreactivity and airway remodeling and possible cellular and molecular mechanisms involved there in were evaluated. Wistar rats were immunized with OVA on day 0 and challenged with 2% OVA aerosol for 30 minutes on alternate day from 15th to 28th day to induce model of airway remodelling. The levels of OVA sIgE, TGF-β and IL-13 were increased as compared to normal controls. Administration of *Albizia lebbeck* (for 28 days) attenuated the levels of OVA sIgE, TGF-β and IL-13, in both blood and BAL fluid, as compared to experimental control group. Similarly, *Solanum xanthocarpum* also attenuated the levels of OVA sIgE, TGF-β and IL-13 in both blood and BAL fluid. Further, both extracts also decreased the hydroxyproline content, a biomarker of collagen production in lung homogenates. The results suggested that *Albizia lebbeck* and *Solanum xanthocarpum* may prevent the airway remodelling by reducing the pro-fibrotic cytokine, (TGF-β and IL-13), inhibiting the production of collagen formation in the lung tissue and reducing the levels of MDA and NOx and elevating the levels of anti-oxidants (GSH and SOD). The results of the toxicity studies suggest that standardized extract of *Albizia lebbeck* and *Solanum xanthocarpum* are safe in acute and sub-acute toxicity studies. Taken together, this study concluded that the standardized extracts of *Albizia lebbeck* and *Solanum xanthocarpum* have anti-inflammatory, immunomodulatory, anti-remodelling, anti-oxidant and anti-hyperresponsive activity in the models of airway inflammation and remodelling and explain the mechanisms contributing to the therapeutic benefits of *Albizia lebbeck* and *Solanum xanthocarpum* in bronchial asthma.

5. A clinical study to evaluate the effects of yoga on pulmonary functions, cellular and molecular markers and quality of life in patients of bronchial asthma

Yoga is an important way of life which has emerged as alternative form of traditional therapy, particularly for chronic diseases. Interactions between traditional and modern medicinal systems are being advocated and modern techniques are being used for validating traditional medicine (easily available, low cost and safe). Bronchial asthma is one of the most common chronic inflammatory diseases of the respiratory tract and pharmacotherapy with bronchodilators and anti-inflammatory agents are associated with undesirable adverse effects. Therefore, a clinical study was conducted to evaluate the effects of yoga on pulmonary functions and quality of life parameters in patients of bronchial asthma. The patients with clinical diagnosis of mild to moderate bronchial asthma, attending the OPD of Vallabhbhai Patel Chest Institute, were recruited for the study and randomized into two groups. In

Group I, patients received conventional anti-asthma treatment whereas, in Group II, patients received conventional treatment plus yoga intervention for 50 minutes daily. Pulmonary functions (PFT), Oxidative stress markers, Fractional exhaled nitric oxide (FeNO), and Quality of Life (QOL) were assessed in all patients at baseline and after three months of treatment.

The study showed a significant improvement in PFT (FEV1 and FVC) and in QOL parameters as assessed by a Questionnaire developed by McMaster University, Canada, in Group II patients. The level of oxidative (MDA and SOD) and nitrosative (FeNO) markers were also reduced significantly in Group II as compared to Group I. Oxidative stress plays an important role in the etiology of bronchial asthma and the present results showed that yogic intervention improved the antioxidant-prooxidant balance, which could have been responsible for reducing the inflammation in airways and improving pulmonary functions.

6. A clinical study to evaluate the effects of yogic intervention on pulmonary functions, inflammatory markers, oxidative stress and health status in patients of COPD

This is a prospective, open label, randomized, parallel design study, in patients of bronchial asthma, selected from the outpatients department of the Viswanathan Chest Hospital, Vallabhbhai Patel Chest Institute, Delhi. The study is being carried out jointly by the Department of Pharmacology and Viswanathan Chest Hospital, Vallabbhbhai Patel Chest Institute. The study evaluated the effects of yoga as an adjunct therapy on pulmonary function test (PFT), fractional exhaled nitric oxide (FeNO), 6 minutes walk test (6 MWT), inflammatory marker– TNF-α and health related status in patients of Chronic Obstructive Pulmonary Disease (COPD). Patients with clinical diagnosis of mild to moderate COPD were recruited for the study as per inclusion/exclusion criteria. They were randomized into Group I (control group, taking conventional drug treatment) and Group II (yogic intervention for 1 hour daily with conventional drug treatment). Pulmonary functions viz. FEV1 (forced expiratory volume in 1 sec), FVC (force vital capacity), FEV1/FVC ratio, FeNO, 6 MWT, inflammatory marker (TNF-α) were measured and health status was evaluated by using St. George Respiratory Questionnaire for COPD (SGRQ-C) in all patients at baseline and after 3 months of treatments. Patients in both the groups showed improvement in PFT and reduction in inflammatory markers. However, group II showed a significant improvement in pulmonary functions as compared to the control group (Group I). Further, the levels of FeNO, a marker of inflammation in respiratory tract, were found to be significantly decreased in yoga group. There was improvement in 6 MWT and health status as measured by SGRQ-C with significant reduction in TNF-α in Group II as compared to Group I.

7. Experimental pharmacological studies for optimization of constituents UNIM-352, a polyherbal preparation, for efficacious and safe treatment of bronchial asthma

Bronchial asthma is a chronic and complex inflammatory disease of the lung characterized by reversible airway obstruction and hyperresponsiveness (AHR) of airways, often in response to one or more triggers. Large number of anti-asthmatic drugs are widely used,but they are not completely safe for long term use and hold some side effects like immune suppression, cardiac abnormalities, hyperglycemia etc. Muscle tremor and hypokalemia are the major adverse effects of β2 agonists. Systemic corticosteroids have common side effects such as disturbance of adrenal function and immune suppression. Therefore, there has always been a demand to identify effective and safe remedy for the treatment of bronchial asthma.The study was designed to evaluate the anti-inflammatory and immunomodulatory effect of various optimized versions of UNIM -352 and comparing the efficacy with classical preparation of UNIM-352 in experimental animals. The rats were immunized with ovalbumin (10 mg) and challenged on 14 day with 1mg of OVA. After 24 hours of ovalbumin challenge, blood and BAL samples were collected for assay of TNF-α levels. Assay for TNF-α showed that UNIM-352 (200 mg/kg and 400 mg/kg) induced suppressions in both blood and BAL fluid in a dose dependent manner as compared to control groups. The reductions were also comparable with the standard drug, prednisolone.Assay for OVA sIgE showed that treatment with UNIM-352, at both the dose levels (200 mg/kg and 400 mg/kg) attenuated OVA specific IgE levels in both BAL fluid and blood as compared to control group. The reductions were also comparable with the standard drug, prednisolone.

8. A comparative pharmacological evaluation of the adaptogenic and immunomodulatory effects of *Withania somnifera* - leaf and root extracts, in experimental animals

The present study was planned to evaluate the adaptogenic effects of *Withania somnifera (Ashwagandha)*

leaf extract using pharmacological and biochemical techniques during stressful situations and to evaluate the possible cellular and molecular mechanisms of action. Chronic restraint stress (RS) induced suppression in the EPM parameters (both open arm entries and open arm time). The RS induced suppression is counteracted by *Withania somnifera* root (WSRE) and leaf extract (WSLE) as well as positive control drug i.e. diazepam. Both WSRE and WSLE in the dose of 50 and 100mg/kg, p.o. had similar effect on the EPM parameters. Plasma corticosterone levels were elevated after chronic RS exposure and this neuroendocrine stress marker was also lowered following pre-treatment with both WSRE and WSLE. The results were comparable with that of the positive control, diazepam group. Chronic restraint stress (RS) induced suppression in the serum IgG levels as compared to Control group of rats. These RS induced changes in antibody levels were attenuated after pre-treatment with WSRE as well as WSLE and diazepam. Again the effect of both WSRE and WSLE are equal in this parameter. RS also induced suppression in the cell mediated immune responses as measured by the DTH assay, and these changes were also reversed after pre-treatment with WSRE and WSLE. Chronic RS exposure lead to differential modulation of cytokinereleased from various immune cells.

9. Pharmacological studies to validate the effects of traditional herbal preparations in experimental models of bronchial asthma in experimental animals

Bronchial asthma is a chronic airway disorder mainly characterized by airway inflammation, reversible airflow obstruction and airway hyperresponsiveness.Therefore, the present study was designed to evaluate the effects of aqueous extract of *Lepidadathistrinervis* and aqueous extract of *Chlorophytumborivilianum* and *Cocculushirsutus* in experimental models of airway inflammation, with an aim to elucidate the cellular and molecular mechanisms to validate its use in bronchial asthma. In the process, the effects of these herbal preparations were assessed on various markers of (a) airway inflammation and immunity (b) bronchial hyperresponsiveness to spasmogens and (c) oxidative stress parameters in OVA sensitized and challenged rats. In OVA-induced model of airway inflammation, *Lepidadathistrinervis* (100, 200 and 400 mg/kg) and *Chlorophytumborivilianum* and *Cocculushirsutus,* attenuated the levels of TNF-α, IL-4, IL-5, IL-13, in both blood and BAL fluid as compared to vehicle treated control group. All these effects were comparable to standard drug prednisolone, which acted as a positive control for the experiments. Both traditional herbal preparations, reduced the levels of MDA and increased the GSH levels in bothboth blood and BAL fluid, which suggests the protective effect of *Lepidadathistrinervis* and *Chlorophytumborivilianum* and *Cocculushirsutus* against reactive oxygen species. These herbal prepartaions also reduced the bronchial hyperreactivity and airflow obstruction to increasing concentration of methacholine. Taken together, it can be concluded from the study that both traditional herbal preparations *Lepidadathistrinervis* and *Chlorophytumborivilianum* & *Cocculushirsutus* has anti-inflammatory, immunomodulatory, anti-oxidant and anti-spasmogenic activity and this could contribute to its therapeutic benefit in bronchial asthma.

10. Experimental studies to evaluate the mode of action of traditional herbal agents in bronchial asthma

The present study has been designed to evaluate the mode of action of *Adiantumvenustum* and *Lychniscoronaria* in an experimental model of bronchial asthma. In an experimental model of airway inflammation, rats were immunized with Ovalbumin (10 mg/rat, i.p.) adsorbed to 10 μg of aluminium hydroxide on day 0. After 14 days of immunization, the animals were challenged with 1 mg of ovalbumin. After 24th of ovalbumin challenge, airway responsiveness was measured in response to inhaled methacholine using whole body plethysmography. Then, animals were anesthetized and blood and BAL fluid were collected for the estimation of biochemical assays. Similarly, for experimental model of airway remodeling, animals were immunizedwith Ovalbumin and aluminium hydroxide on day 1and challenged with aerosolized ovalbumin from day 15-21. After 21 days, airway hyperresponsiveness was assessed. Then animals were anesthetizedand blood and BAL were collected for assay of various biochemical test. The lungs of each animal were removed for hydroxyproline estimation and histopathological examinations.

11. Effects of *Withania somnifera* extract on experimental model of type 2 diabetes mellitus induced Alzheimer`s disease and the possible mechanisms in rats

The present study is designed to investigate the mechanism of action of *Withania somnifera* extract on cognition impairment by studying the markers of inflammation, oxidative stress and Aβ in high fat diet- streptozotocin (HFD-STZ) induced diabetic rats. The project has been approved by the Institutional animal ethics committee (IAEC) and work will be started.

12. Experimental studies on the hepatoprotective and immunomodulatory effects of Dawa-Ul-Kurkum, a polyherbalUnani preparation, and its cellular and molecular mechanisms, in rats

The study has been designed to evaluate the hepatoprotective and immunomodulatory effects of Dawa-Ul-Kurkum, a polyherbalUnani preparation. It is composed of Sumbul-ul-Teeb, Mur Makki, Salcekha, Quas, Shagufa-e-Izkhar, Darchini, Zafran with Sharab-e-musallas and Asal in sufficient quantity to make the required volume. As per Unani literature it is used in liver dysfunction, anorexia, ascites and abdominal pain (National Formulary of Unani Medicine, 2011-15). In order to validate the effects of this compound its efficacy in experimental model of dysfunction will be investigated and an attempt will be made to assess the cellular and molecular mechanisms involved in mediating such effects. The effects of this preparation will also be investigated on immune markers. Accordingly the effects of this compound will be assessed on markers of inflammation and immunity viz. immunoglobulin levels, cell mediated immune responses, relevant cytokines and oxidative stress markers. The hepatotoxicity model was standardized with anti-tubercular drugs and samples are being collected for analysis.

Physiology

Research

1. Development of exercise protocol to improve hypoxic tolerance

Rapid induction to high altitude is associated with risk of development of high altitude maladies such as High Altitude Pulmonary Edema (HAPE) and High Altitude Cerebral Edema (HACE). Due to lack of adequate time available for individuals to acclimatize to the hypoxic environment, this is associated with decreased arterial oxygen saturation and increased pulmonary artery pressures, both of which contribute to the impaired exercise performance. Significant portion of this impairment is attributed to hypoxic pulmonary vasoconstriction (HPV). This response leads to increased pulmonary arterial pressure resulting in increased right ventricular afterload and decreased cardiac output.

Recently, ischemic preconditioning (IPC), a procedure which is performed by repetitive occlusion of arterial blood flow to an organ or extremity (e.g., 5 minutes occlusion, followed by 5 minutes of restored blood flow, repeated several times) has been shown to induce systemic effects that protect the myocardium and other organs from ischemic injury. It has also been demonstrated that the hypoxic increase in pulmonary artery systolic pressure during acute simulated altitude conditions is significantly attenuated by IPC.

Since IPC and HPV have similar mechanistic pathways i.e. hypoxia, but confer opposing effects, it is hypothesized that IPC exposure would attenuate HPV and improve hypoxia tolerance. Further, in view of the fact that exercise training is known to improve exercise capacity in chronic respiratory disease patients, this study is being conducted to explore the beneficial effects of addition of IPC along-with exercise trainingin healthy and chronic respiratory disease patients.

2. To compare effect of endurance training by basketball playing in thoracic 1 to 5 and thoracic 6 to 12 level wheel chair bound paraplegic patients on cardiac autonomic and functional parameters

Spinal cord injury (SCI) below cervical level leads to paraplegia and manifests as impairment/loss of motor or sensory function in thoracic, lumbar or sacral segments. Secondary to damage of neural elements within the spinal canal,where arm functioning is spared but, depending on level of injury, trunk, legs and pelvic organs are affected. Severity and neurological level of the SCI has a major impact on Autonomic Nervous system (ANS) functioning and psychological well-being. Loss of supra-spinal control of the ANS below the level of the lesion increases the cardio-vascular morbidity and mortality.

To improve functional disability and promote psychological well-being,American College Of Sports Medicine has recommended several exercise protocols. Recreational Wheelchair Basketball game is one such modality to improve SCI patients. It includes,wheeling task like sprint and endurance which are both strongly correlated with aerobic fitness. It is recommended that 3-5 exercise sessions per week for 20-60 minutes duration with an intensity of 50%-80% of each person's peak heart rate confers improvement in cardiac autonomic functioning.

Present study aims to compare cardiac autonomic and functional disability in upper (T_{1-5}) and lower (T_{6-12}) Thoracic SCI patients and to examine whether endurance training imparted through wheelchair basketball drills improves this disability.

3. Effect of high volume high intensity interval training on physiological parameters, body composition and lower limb strength in long distance runners: a pilot study

Long distance running is a form of continuous running over distance of at least three kilometers. Physiologically, it is aerobic in nature and requires stamina as well as strength. Regular aerobic endurance training improves physical fitness and heart rate recovery. High intensity interval training (HIIT) is generally characterized by repeated sessions of brief, intermittent exercise, typically at intensities that elicit> 85% of peak oxygen uptake (VO_{2peak}), and is interspersed by periods of rest or low –intensity exercise for recovery. It has been demonstrated that both high and low volumes of HIIT significantly improve maximal oxygen consumption (VO_{2max}).

Athletic performance at high altitude is affected and gets reduced. At 5,000 feet above sea level, VO_{2max} is similar to sea level. However, going up from there, VO_{2max} drops at least 3 percent with each 1,000 feet of ascent. Though acclimatization helps the body to adjust to a higher altitude, it doesn't improve the performance. It is recommended that 10 to 20 days of acclimatization is necessary for athletes before they reach their optimal level of performance.

Very little data is available about the response of highly trained individuals to HIIT and altitude. Although typically an integral component of training programs for the enhancement of athletic performance, effect of HIIT on the performance at high altitude in endurance-trained individuals is sparse.

Purpose of this study is to evaluate the effect of high volume HIIT in long distance runners and examine its effect on physiological variables and their response to normobaric hypoxia.

Pulmonary Medicine

(Including Pulmonary Medicine, Cardo-respiratory Physiology and Respiratory Allergy and Applied Immunology)

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

Research

1. Prevalence of aeroallergens in patients of bronchial asthma and/or allergic rhinitis in India based on skin prick test reactivity

Exposures to various aeroallergens play a crucial role in the pathogenesis of bronchial asthma (BA) and allergic rhinitis (AR). On the basis of climate change, the prevalence of aeroallergens may vary in different regions. The aim of the study was to determine the prevalence of the sensitivity to aeroallergens among patients with BA and/or AR based on skin prick test (SPT) reactivity in India. This study was conducted at National Centre of Respiratory Allergy, Asthma and Immunology and Department of Respiratory Allergy and Applied Immunology, (Department of Respiratory Medicine), Vallabhbhai Patel Chest Institute, University of Delhi, Delhi-110007 (India). A total of 4835 patients were screened from the Outpatient Department of institute during the period of August 2008 to July 2016. Out of 4835 patients, 4263 patients were performed SPT consisting of 2361 (55.38%) males and 1902 (44.62%) females, with a mean age of 30.06 years were included in the study. Diagnosis of BA and AR was made according to the GINA and ARIA guidelines, respectively. SPT was done with 58 different types of aeroallergens, which included grass pollens, weed pollens, tree pollens, dust, fungi, insects, kapok cotton, wool, and silk antigens. Data analysis was done using Excel 2007. Results: Significant skin positive reaction (2 + and above) against aeroallergens were found in 1993 (46.77%) participants including 422 (9.9%) BA patients, 570 (13.37%) AR patients, and 1001 (23.48%) of both BA/AR. The younger adults aged 20–29 years were the foremost commonly affected group with 626 (14.68%) significant skin-positive patients. Among individual allergens, most common aeroallergen was mosquito (30.89%) and least common was Ehretia (0.37%). In different states of India, the mosquito was found the most common sensitizing allergen in BA and/or AR patients. Sensitization was the most common in the younger age group (20–29 years) patients

2. Identification of airborne pollens in Delhi

To quantify and identify the pollen grains in the atmosphere of Delhi. Settings and design: the study was conducted at the national centre of respiratory allergy, Asthma and immunology, Vallabhbhai Patel Chest Institute (VPCI), University of Delhi, Delhi, India. The study was conducted for 2 months at VPCI, university of Delhi (north campus), Delhi. Pollen grains were collected on a daily basis using 24-h Burkard (UK) Volumetric air sampler. Trapped pollen film was stained with a fuchsin stain that is protected with a cover slip and examined under a light microscope. Identification was done with the help of manuals For pollen identification. Data analysis was done by microsoft excel 2007. In this study period (April and May 2017), a total of 10,858/m^3 pollens were counted; of these, 7758/m^3 pollens of 34 species of trees, weeds, and grasses were identified. Overall, *juniper* Sp. (1385/m^3) pollen of tree was found to be the most dominant pollen, followed by *cannabisSativa* (726/m^3), pooideae grasses (e.g. Poa sp., *lolium perenne, dactylis glomerata*) (654/m^3), *Cynodon dactylon* (509/m^3), *amaranthus* sp. (506/m^3), *artemisia* sp. (460/m^3), cassia sp. (447/m^3), *Chenopodium album* (412/m^3), *helenium autumnale* (381/m^3), and *parthenium* (301/m^3). *Juniper* sp. (1310/m^3) pollens in April 2017 and *c. Sativa* (421/m^3) pollens in May 2017 have shown their dominance. In our study, various pollens of different plant species were counted and identifiedIn this short study period. The common pollens found were *juniper* sp., *c. Sativa,* pooideae grasses (e.g. Poa sp., *lolium perenne, dactylis glomerata*), *c. Dactylon, amaranthus* sp., *c. Album, h. Autumnale, parthenium*, and *artemisia* sp. In 2 months. This short study may be helpful for the respiratory allergic patients to protect themselves by pollens

3. National tobacco quitline: the preliminary Indian experience

Tobacco Quitline Services have the potential to reach a large number of tobacco users with the sole objective to provide telephone-based, information, advice, support, and referrals for tobacco cessation and is available free in most developed countries. India too now joins the international tobacco cessation movement with its own National level Tobacco Quitline Service. The purpose of this study is to evaluate the impact and success of National Tobacco Quitline Services (NTQLS) in the first year of its inception. Collection of data was done by telephonic interview method and was extracted from the National Tobacco Quitline Services (NTQLS) database from May 30, 2016 to May 31, 2017. The tobacco users call at NTQLS tollfree number, assigned to receive four proactive calls from NTQLS. The proactive calls are set according to quit date. The registered subjects require furnishing of details about their tobacco use, history and personal information like name, age, address and other demographic data. The study evaluated the subject's tobacco dependence level. The subjects were offered sessions of counselling and choice to receive self-help material. The severely tobacco dependent subjects were referred to nearest tobacco cessation center. A total of 60,222 calls hit the IVR (Interacted Voice Response System) of the NTQLS. 16,548 inbound calls were received and 94,900 outbound calls were made by the counsellors. The highest number of callers (46.5%) were from the state of Uttar Pradesh followed by Delhi (11.8%), Maharashtra (8.4%), Madhya Pradesh (4%), Rajasthan (3.8%), Haryana (3.4%), Gujarat (3.0%), Bihar (2.8%), West Bengal (2.8%), Punjab (2.4%), Karnataka (1.8%), Himachal Pradesh (1.3%), Odisha (1.3%), Jammu and Kashmir (0.8%), Telangana (0.7%), Jharkhand (0.6%), Tamil Nadu (0.5%), Andhra Pradesh (0.4%) and Kerala (0.3%). The north-eastern region including Nagaland, Mizoram, Meghalaya, Sikkim and Tripura contributed only 14 calls (0.3%). A total of 5179 callers were registered. There were 5067 (97.8%) male callers and 112 (2.2%) female callers for enrolling in the tobacco cessation programme. Smokeless form of tobacco use was the most prevalent than smoking (61.2% versus 26.4%). Both forms of tobacco (smoking and smokeless) was used by 12.4% of the callers. *Khaini* (47%) was found as the most prevalent smokeless tobacco product followed by *Gutkha* (43%). The number of cigarette smokers was found to be 73% followed by bidi smokers (25%). 17% of the registered subjects were found to be severely dependent on tobacco, 44% were moderately dependent where as 39% had low dependence. Nearly 68% of the callers had already made an attempt to quit tobacco; but were not successful. 2010 callers (38.81 %) successfully quit tobacco upto the last follow-up (proactive call – 4). Successful quitters (89%) did not have any difficulty or very less difficulty in managing withdrawal symptoms. Our observations suggest that the National Tobacco Quitline Services is freely accessible to the whole country. It is the easiest and most convenient way of tobacco cessation. The response showed that almost 40% of successful quitters were able to maintain tobacco cessation till the last proactive call during the first year of the start of the NTQLS.

Postgraduate Training and Teaching

The Institute was initially started with a Diploma course in Tuberculosis and Chest Diseases (DTCD). Later the MD, DM and PhD courses were started. The Institute continues to conduct the MD, DM and PhD courses in Pulmonary Medicine, Biochemistry, Microbiology, Pharmacology and Physiology. The students currently enrolled in these courses are shown below.

MD Degrees (Awarded)

(Session: 2014-2017)

Name	Discipline
Dr Sekhar Kunal Jha	Pulmonary Medicine
Dr Manu Madan	Pulmonary Medicine
Dr Nipun Malhotra	Pulmonary Medicine
Dr Harsh Vardhan	Pulmonary Medicine
Dr Aditi	Microbiology
Dr Rashi Khanna	Microbiology
Dr Goutam Arora	Pharmacology

MD Theses (Submitted)

(Session: 2015-2018)

Sl. No.	Name (Discipline)	Title of Theses	Supervisor(s)
1.	Dr Ambuj Kumar (Pulmonary Medicine)	Characterization of frequent exacerbator phenotype in COPD	Prof. S.K. Chhabra and Prof. Raj Kumar
2.	Dr Anshu Priya (Pulmonary Medicine)	Association of obstructive sleep apnea in patients of COPD and asthma	Prof. Raj Kumar
3.	Dr Arya Gopi (Pulmonary Medicine)	Evaluation of KL6 as a diagnostic and prognostic marker of pulmonary sarcoidosis	Dr B.K. Menon
4.	Dr Vidushi Rathi (Pulmonary Medicine)	A cross-sectional study to evaluate the association of iron deficiency with quality of life in patients with COPD	Prof. S.N. Gaur
5.	Dr Gulvir Singh (Pulmonary Medicine)	A cross-sectional study to characterize asthma-COPD overlap syndrome among patients with asthma and COPD	Prof. S.N. Gaur
6.	Dr Bhagwan Singh Patidar (Biochemistry)	A study on 5'-Nucleotidase, adenosine deaminase and adenosine level in serum, lymphocytes and erythrocytes of COPD patients	Prof. S.K. Bansal, Dr B.K. Menon and Dr V. Rohil
7.	Dr Gargi Upadhyaya (Microbiology)	Matrix assisted laser desorption ionization-timeofflightmassspectrometry (MALDI-TOF MS) characterization and antifungal susceptibility pattern of non-albican Candida (NAC) and allied yeast like fungi from clinical specimens	Dr Anuradha Chowdhary
8.	Dr Abhyanchal Kishore Jha (Physiology)	Cardiac autonomic dysfunction in patients with chronic obstructive pulmonary disease and its association with depression	Dr Vishal Bansal and Prof. S.K. Chhabra

MD Theses (Ongoing)

(Session: 2016-2019)

Sl. No.	Name (Discipline)	Title of Theses	Supervisor(s)
1.	Dr Lovika Lakhtakia (Pulmonary Medicine)	Spectrum of pulmonary aspergillosis in treated patients of pulmonary tuberculosis	Dr Raj Kumar
2.	Dr Naveen Vennilavan RA (Pulmonary Medicine)	Characterisation of phenotype in asthma subgroups	Dr Raj Kumar
3.	Dr Neha Kaushik (Pulmonary Medicine)	Effect of anxiety and depression on quality of life in Interstitial Lung Diseases	Dr Raj Kumar
4.	Dr Priyanka (Microbiology)	*Candida glabrata* and related cryptic species: A study of their characterization by matrix assisted laser desorption ionization-time of flight spectrometry (MALDI-TOF MS) and antifungal susceptibility profiling with special refrence to molecular mechanism of echinochandin resistance	Dr Anuradha Chowdhary
5.	Dr Ravinder Kumar Yadav (Pharmacology)	A comparative pharmacological evaluation of the adaptogenic and mmunomodulatory effects of *Withania somnifera* - leaf and root extracts, in experimental animals	Dr Kavita Gulati and Prof. A. Ray

MD – Ist Year

(Session: 2017-2020)

Name	Discipline
Dr Priyadarshini S	Pulmonary Medicine
Dr Preeti	Pulmonary Medicine
Dr Akshit Gupta	Pulmonary Medicine
Dr Himanshu Saini	Pulmonary Medicine
Dr Tome Kamgo	Pulmonary Medicine
Dr Tonushyam Sonowal	Microbiology

DM Theses (Awarded)

(Session: 2014-17)

S. No.	Name (Discipline)	Title of Theses	Supervisor(s)
1.	Dr Chandrakant Tarke (Pulmonary Medicine)	Occurrence of bronchiectasis in patients with COPD: smokers versus never smokers and the association of upper airway symptoms with quality of life in these patients	Prof. Ashok Shah
2.	Dr Supreet Batra (Pulmonary Medicine)	An association of depression in asthma and role of pulmonary rehabilitation versus anti-depressant in patients with moderate and severe asthma	Prof. S.N. Gaur and Dr Vishal Bansal

PhD Awarded/Submitted

S. No.	Name (Discipline)	Title of Theses	Supervisor(s)	Status
1.	Ms Apoorva Pandey (Biochemistry)	Role of innate immune response mechanisms in development of bleomycin induced lung fibrosis	Prof. S.K. Bansal and Dr Ritu Kulshrestha	Submitted
2.	Mr Anupam Prakash (Microbiology)	A study of *Cryptococcus* species in immunocompromised patients	Dr Anuradha Chowdhary and Prof. H.S. Randhawa	Submitted
3.	Mr Naresh Kumar (Microbiology)	Expression analysis of an array of genes of *Mycobacterium tuberculosis* clinical isolates from pulmonary tuberculosis and lymph node tuberculosis: search for mycobacterial factors associated with different clinical manifestations	Dr Mandira Varma-Basil and Prof. Mridula Bose	Submitted
4.	Mr Md. Shamsuzzaman (Pharmacology)	Pharmacological studies on the possible mechanisms involved in theophylline induced cardiotoxicity in rats	Prof. A. Ray and Dr Kavita Gulati	Submitted
5.	Mr Tapan Behl (Pharmacology)	To evaluate the effect of *Terminalia catappa* fruit and seed extract in streptozotocin induced diabetic retinopathy in rats	Dr Anita Kotwani	Submitted
6.	Mr Lakshmi Kanth Kotarkonda (Physiology)	An insight into the mechanisms of bleomycin induced pulmonary fibrosis	Prof. K. Ravi	Submitted
7.	Ms Sulekha Chaudhary (Pharmacology)	Studies on the anti-inflammatory and immunomodulatory effects of *Albizia lebbeck* and *Solanum xanthocarpum* in experimental models of bronchial asthma	Dr Kavita Gulati and Prof. A. Ray	Submitted
8.	Mr Harikesh Dubey (Pharmacology)	Experimental studies on the association between Alzheimer`s disease and diabetes mellitus: a novel approach to possible therapeutic strategies	Prof. A. Ray and Dr Kavita Gulati	Submitted
9.	Ms Cheshta Sharma (Microbiology)	Molecular mechanisms of triazole antifungal resistance in *Aspergillus fumigatus* and *Aspergillus flavus* originating from clinical and environmental sources	Dr Anuradha Chowdhary	Submitted
10.	Mr Pradeep Kumar Singh (Microbiology)	Phenotypic and molecular characterisation, antifungal susceptibility profiles and clinical significance of *Basidiomycetes* molds occurring in patients with respiratory disorders	Dr Anuradha Chowdhary and Prof. S.N. Gaur	Submitted

S. No.	Name (Discipline)	Title of Theses	Supervisor(s)	Status
11.	Mr Dibya Ranjan Pati (Microbiology)	Nano-therapeutic application of small interfering ribonucleic acid (RNA) and micro RNA against human influenza virus	Dr Madhu Khanna and Dr A.C. Banerjee (NII, New Delhi)	Submitted
12.	Ms Shraddha Porwal (Microbiology)	Phenotypic and genotypic indicators of pre MDR tuberculosis: Prediction of the development of MDR tuberculosis	Dr Mandira Varma-Basil and Prof. Rajendra Prasad	Submitted
13.	Mr Gaurav Tyagi (Microbiology)	To study the role of biotin in the biology of *Mycobacterium tuberculosis*	Dr Mandira Varma-Basil, Prof. Mridula Bose and Prof. Ashok Prasad (Department of Chemistry, University of Delhi)	Submitted

PhD Theses (Ongoing)

S. No.	Name (Discipline)	Title of Theses	Supervisor(s)	Year of Registration
1.	Mr Manoj Kumar (Biochemistry)	Studies on erythrocyte membrane protein profile and oxidant and antioxidant status of blood in bronchial asthma	Prof. S.K. Bansal Prof. Rajendra Prasad and Prof. S.K. Chhabra	2013
2.	Mr Anil Meena (Biochemistry)	A study on CRHR1 and GR gene polymorphism and their correlation with the expression of various inflammatory cytokines in asthma in North Indian population	Prof. S.K. Bansal, Prof. S.K. Chhabra and Dr B.K. Menon	2015
3.	Ms Astha Giri (Microbiology)	Characterization of genotypic indicators of ethambutol resistance in clinical isolates of *Mycobacterium tuberculosis*	Dr Mandira Varma-Basil and Dr Sadhna Sharma Miranda House, University of Delhi	2014
4.	Mr Sanjesh Saini (Microbiology)	Role of microRNA in pathogenesis of influenza A virus infection	Dr Malini Shariff and Dr Madhu Khanna	2015
5.	Mr Chanchal Kumar (Microbiology)	Functional analysis of cell infusion proteins of *Mycobacterium tuberculosis* as potential target for vaccine development	Dr Mandira Varma-Basil and Dr Sadhna Sharma Miranda House, University of Delhi	2017
6.	Ms Tanushri Nandi (Microbiology)	Anti-influenza activity of immune modulatory peptides	Dr Madhu Khanna and Prof. Nirupama Trehanpati, Department of Molecular Immunology, Institute of Liver and Biliary Sciences, New Delhi	2017
7.	Mr Kamal Srivastava (Microbilogy)	Evaluation fo an arrary of PE-PPE gene for potential use in a diagnostic assay to identify *Mycobacterium tuberculosis*	Dr Mandira Varma-Basil and Dr Sadhna Sharma Miranda House, University of Delhi	2017
8.	Mr Ashutosh Singh (Microbiology)	Multi-gene phylogengy and MALDI-TOF-MA characterization of melanised fungi and determination of their antifungal susceptibility profiles	Dr Anuradha Chowdhary	2017

S. No.	Name (Discipline)	Title of Theses	Supervisor(s)	Year of Registration
9.	Ms Babita Kumari (Pharmacology)	A clinical study to evaluate the effects of yoga on pulmonary functions, cellular and molecular markers and quality of life in patients of bronchial asthma	Dr Kavita Gulati, Prof. A. Ray and Dr B.K. Menon	2015
10.	Mr Maaz Naqvi (Pharmacology)	Experimental pharmacological studies for optimization of constituents UNIM-352, a polyherbal preparation, for efficacious and safe treatment of bronchial asthma	Dr Kavita Gulati, Prof. A. Ray and Dr B.K. Menon	2015
11.	Mr Anshul Tanwar (Pharmacology)	Experimental studies on the effects of *Withania somnifera* extract on type 2 diabetes mellitus induced Alzheimer`s disease and the possible mechanisms in rats	Dr Kavita Gulati and Prof. A. Ray	2017
12.	Mr Suresh K. Thokchom (Pharmacology)	A clinical study to evaluate the effects of yogic intervention on pulmonary functions, inflammatory markers, oxidative stress and health status in patients of chronic obstructive pulmonary disease (COPD)	Dr Kavita Gulati, Prof. A. Ray and Dr B.K. Menon	2017
13.	Mr Pankaj Verma (Pharmacology)	Experimental studies to evaluate the mode of action of Traditional herbal agents in bronchial asthma	Prof. A Ray and Dr. Kavita Gulati	2017
14.	Mr Anil Kumar Mavi (Pulmonary Medicine) Faculty of Medical Science, University of Delhi, VPCI	Biochemical and clinico-immunologic characterization of pigeon *(Columba livia)* allergens (feathers and droppings) in asthma patients	Prof. Raj Kumar and Prof. S.N. Gaur	2014

Faculty Members Associated as Co-supervisors for MD/PhD Theses of DU and Other Institutions

S. No.	Name (Discipline) and Institution's name	Title of Theses	Supervisor(s)	Status
1.	Mr Jamal Ali Moiz (PhD Physiotherapy) Jamia Millia Islamia University, New Delhi	Effect of the addition of balance training to pulmonary rehabilitation for patients with COPD	Prof. M. Ezaj Hussain Prof. S.N. Gaur and Dr Vishal Bansal	Submitted
2.	Ms Karuna Sharma (PhD Biochemistry) Faculty of Medical Sciences, University of Delhi, Delhi	Genetic polymorphism of matrix metalloproteinases-9 (MMP-9) and its correlation with the maternal serum level of biomarkers (PAPP-A, free β-hCG) and proinflammatory cytokines in preeclampsia in north Indian population	Prof. Ritu Singh (Department of Biochemistry, Lady Harding Medical College, New Delhi, Prof. Jayashree Bhattacharjee (Vardhman Mahavir Medical College and Safdarjung Hospital, New Delhi) and Dr Viswajeet Rohil	Submitted
3.	Dr Kakasaheb H. Bhosale (MD Medicine) Ram Monahar Lohia Hospital, New Delhi	Cryptococcal antigenemia in anti-retroviral therapy naïve patients with human immunodeficiency virus infection	Dr Brijesh Sharma (Dept. of Medicine, RML Hospital, PGIMER & RML Hospital, New Delhi) and Dr Anuradha Chowdhary	Ongoing
4.	Ms Smriti Gupta (PhD Biochemistry) Department of Chemistry, SRM University, Delhi-NCR, Sonepat, Haryana,	Understanding chronic obstructive pulmonary disease by studying single nucleotide polymorphism in Delhi-NCR population	Dr Ajit Kumar, Head, Department of Chemistry, SRM University, Delhi-NCR, Sonepat, Haryana, Dr Anju Bhatnagar, Rajan Babu Institute for Pulmonary Medicine & Tuberculosis (RBIPMT), New Delhi and Dr Viswajeet Rohil	Ongoing
5.	Ms Anita Singh (PhD Microbiology) Amity Institute of Virology and Immunology, Amity University, Noida	Characterization of recombinant outer membrane proteins of *L. interogans* serovars	Dr M.M. Premlatha Amity Institute of Virology and Immunology, Noida (UP) and Dr Malini Shariff	Ongoing

S. No.	Name (Discipline) and Institution's name	Title of Theses	Supervisor(s)	Status
6.	Mr Kaushik Bhattacharya (MSc-PhD combined Programe in Biomedical Sciences) Dr B.R. Ambedkar Centre for Biomedical Research, University of Delhi, Delhi	Novel non synonymous mutations in a multi-drug resistant isolate of *M. tuberculosis*	Dr Vani Brahmachari (Dr B.R. Ambedkar Centre for Biomedical Research, University of Delhi, Delhi) and Dr Mandira Varma-Basil	Ongoing
7.	Ms. Nishtha Agarwal (PhD Biomedical Sciences) Department of Biomedical Sciences, ANDC, University of Delhi, Delhi	Antigenic and genetic analysis of influenza virus isolated from clinical samples and exploring the potential antiviral target sites	Dr Gagan Dhawan (Department of Biomedical Sciences, ANDC, University of Delhi, Delhi) and Dr Madhu Khanna	Ongoing
8.	Dr Nisha Yadav (MD Medical Microbiology) Lady Hardinge Medical College, New Delhi	Study of vulvovaginal candidiasis in pregnant females	Dr V.S. Randhawa (Department of Microbiology, LHMC and Associated Hospitals, New Delhi) and Dr Anuradha Chowdhary	Awarded
9.	Mr Nilanshu Manocha (PhD Biomedical Sciences) Department of Biomedical Sciences, ANDC, University of Delhi, Delhi	Study on the generation of peptide immunogen against dengue virus	Dr Ambedkar Centre for Biomedical Research (ACBR) and Dr Madhu Khanna	Ongoing (2017)
10.	Dr Anamika MS (Otorhino-laryngology and Head and Neck Surgery) Department of LHMC & Associated Kalawati Saran Children Hospital, New Delhi	Clinical profile, aeroallergen sensitivity and assessment of pulmonary function in pediatric chronic rhinosinusitis	Dr A. Chakravarti LHMC and Associated Hospitals, New Delhi and Prof. Raj Kumar	Ongoing
11.	Mr Manoj Kumar PhD (Applied Chemistry) Department of Applied Chemistry, SoVSAS, Gautam Buddha University Greater Noida, (UP)	Biochemical and clinico-immunologic characterization of allergenic proteins of *Periplaneta americana* in asthma patients	Dr Rajesh Kumar Gupta Department of Applied Chemistry, SoVSAS, Gautam Buddha University Greater Noida, (UP) and Prof Raj Kumar	Ongoing

Distinguished Visitors

- Dr Tapas Sen, Group Leader, Nanobiomaterials Research Group, School of Physical Sciences & Computing, University of Central Lancashire, Preston, UK, June 10, 2017
- Dr Randolf Brehler, (University Klinikum Munster, Germany) visited during the programme of 1st Indian Summit on Allergy Diagnosis and Immunotherapy on December 8-9, 2017

Awards/Honours

Prof. S.K. Bansal

- Nominee of Vice Chancellor, University of Delhi, to represent the University under Statute 30(1)(C) (i) of Statutes of the University on the Advisory Committee of College of Nursing, Army Hospital (R&R) for a period of one year w.e.f. 18.10.2017 and Advisory Committee of Raj Kumari Amrit Kaur College of Nursing for a period of one year w.e.f. 15.11.2017 and Governing Body of School of Rehabilitation Sciences for a period of one year w.e.f. 23.01.2018
- Secretary General, Biotechnology Society of India, 2017
- Vice-President, Association of Clinical Biochemists of India
- Member, Grievance Redressal Committee [Under the UGC (Grievance Redressal) Regulation, 2012

Prof. Raj Kumar

- **Environmental Excellence Award 2017,** Exemplary contribution for protecting environment by Environment and Social Development Association (ESDA) Delhi, India
- **Editor-in-Chief,** *Indian Journal of Chest Diseases and Allied Sciences,* an official publication of the V.P. Chest Institute and the National College of Chest Physicians (India)
- **Fellow,** National Academy of Medical Sciences, New Delhi
- **Member,** Expert Committee for functioning of BLDE University, Karnataka
- **Member,** Standing Committee, Academic Council, University of Delhi
- **Anti-Discrimination Officer,** University of Delhi, Delhi
- **Achievers Award,** Exemplary contribution and commitment for protecting environment on the eve of World Environment Day 2017, Indian Eye International Human Right Observer and UN Information Centre for India and Bhutan on 05.06.2017

Dr Malini Shariff

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

Dr Mandira Varma-Basil

- **Member,** Ethics Committee, Rajan Babu Institute of Pulmonary Medicine and Tuberculosis, Delhi
- **Secretary,** Indian Association of Mycoplasmologists

Dr Anuradha Chowdhary

- **Dr Y. S. Narayana Rao Oration Award,** sustained research in Microbiology, 2017
- **Women Achiever Award in Health Care,** International Women's Week, Amity University, Uttar Pradesh
- **Member,** Editorial Board, *Journal of Clinical Microbiology* (American Society of Microbiology)
- **Editor,** *mBio* (American Society of Microbiology)
- **Editor,** *Medical Mycology* (International Society of Human & Animal Mycology)
- **Member,** Editorial Board, *Journal of Hospital Infection* (Healthcare Infection Society, UK)

Dr Madhu Khanna

- **Travel Award,** 5th ISIRV-AVG Conference on 14-16 June 2017, Shanghai, China
- **ESCMID Observer,** University Medical Center Groningen, Groningen, Netherlands

Dr Anita Kotwani

- **Member,** Core Working Group and Technical Advisory Group on AMR, Ministry of Health and Family Welfare to oversee and coordinate policy decisions and activities relating to antimicrobial resistance and for "National consultation to operationalize NAP-AMR"

Dr Kavita Gulati

- **Fellow,** International Academy of Cardiovascular Sciences (FIACS), Winnipeg, Canada
- **Treasurer,** Society for Nitric Oxide and Allied Radicals (SNOAR
- **Member,** Editorial Board, *Pharmacology and Toxicology Journal*

Dr Ritu Kulshrestha

- **Editor,** VPCI Newsletter

Dr Vishal Bansal

- **Member,** Editorial Board, *Journal of Krishna Institute of Medical Sciences University,* an official publication of Krishna Institute of Medical Sciences University, Karad, Maharashtra

Dr Vishwajeet Rohil

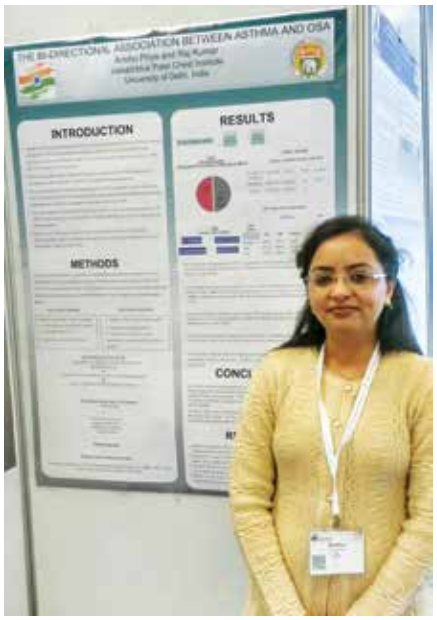
- **Best Teacher Award,** Grace India Educational Charitable Trust

Dr Naveen Vennilavan R (MD Student)

- Received Third Prize for poster presentation on "COPD: Chronic Pulmonary Aspergilosis" at Obstructive Airway Diseases and NIV Conference, at PGIMS, Rohtak, February, 2017.

Dr Anshu Priya (MD Student)

- Received Third Prize for oral paper presentation on "Effect of OSA on COPD", during Prof. S.N. Gaur Yound Scientist Award at 19th Joint National Conference of the National College of Chest Physicians (NCCP) and Indian Chest Society (ICS) NAPCON - 2017", Science City, Kolkata, November 16-19, 2017



Ms Astha Giri (PhD Student - Microbiology)

- Received First Prize for free poster presentation on "Mutations in Rv3805c (*aftB*): A probable cause of high-level ethambutol resistance in clinical isolates of *Mycobacterium tuberculosis"*; at 38th Annual Congress of European Society of Mycobacteriology, Sibenik, Croatia on June 25–28, 2017.
- Awarded travel grant by Indina Council of Medical Research, New Delhi, for presenting a poster on "RV0089: does it have a role in growth and pathogenesis of *M. tuberculosis?"*; at Valencia, Spain on July 9–13, 2017.

Mr Tapan Behl (PhD Student - Pharmacology)

- Received "Young Achiver Award", in Pharma Rattan Award and International Pharmaceutical Conference at New Delhi on November 26, 2017.
- Received *"Best Researcher Award"*, by Grace Educational Charitable Trust at Hansraj College, University of Delhi, Delhi on October 7, 2017.
- Received *"Award for Research Excellence"*, by The Indus Foundation at New Delhi on July 28, 2017.

Sponsored Research Projects

S. No.	Faculty Member (Department)	Title of Project	Funding Agency, Date of Sanction/ Implementation and Duration	Grants received (in ₹)
1.	VPCI-DHR-ICMR	Multidisciplinary Research Unit	DHR, MoHFW January 01, 2014 (Five years)	359.23 lakhs
2.	Dr Malini Shariff (Microbiology)	Microbiome of human lung in COPD patients attending VPCI, Delhi	DBT March 19, 2015 (Two years) [extended upto 18.09.2017]	25 Lakhs
3.	Dr Malini Shariff (Microbiology)	Isolation and characterization of anaerobic bacteria causing lower respiratory tract infections in patients attending VPCI, Delhi	ICMR March 01, 2017 (Three years)	16.73 Lakhs
4.	Dr Mandira Varma-Basil (Microbiology)	A point of care diagnostic tool for tuberculosis	DST September 3, 2014 (Three Years) [extended upto 07.11.2017]	34.77 Lakhs
5.	Dr Mandira Varma-Basil (Microbiology)	Phenotypic and genotypic indicators of drug resistant tuberculosis: can they be used as early warning system for MDR and XDR tuberculosis?	ICMR March 31, 2015 (Three years)	57.26 Lakhs
6.	Prof. Anuradha Chowdhary (Medical Mycology) ICMR-III	Multilocus microsatellite typing and antifungals profile of clinical *Cryptococcus neoformans* species complex isolated from patients of cryptococcosis	ICMR November 15, 2017 (Three years)	13.13 lakhs
7.	Dr Madhu Khanna (Respiratory Virology)	Evaluation of antiviral activity of medicinal plant extracts against influenza A virus	AYUSH/Central Council for Research in Ayurvedic Sciences (CCRAS) January 25, 2014 (Three years) [extended upto 31.12.2018]	21.73 Lakhs
8.	Dr Madhu Khanna (Respiratory Virology)	Aptamer-mRNA Chimera – the next generation RNA vaccine	DST August 19, 2016 (Three years)	20.31 Lakhs
9.	Dr Ritu Kulshrestha (Pathology)	Study of the transcriptional mechanisms underlying pulmonary fibrosis and their modulation by therapeutic agents	DST May 21, 2015 (Three years)	43.00 Lakhs

S. No.	Faculty Member (Department)	Title of Project	Funding Agency, Date of Sanction/ Implementation and Duration	Grants received (in ₹)
10.	Prof. A. Ray (Pharmacology)	Experimental studies on the association between Alzheimer`s disease and diabetes mellitus: a novel approach to possible therapeutic strategies	DST October 17, 2013 (Three years) [extended upto 16.04.2017]	33.80 Lakhs
11.	Prof. A. Ray (Pharmacology)	Pharmacological studies to validate the effcts of traditional herbal preparations in experimental models of bronchial asthma in experimental animals	NIF July 28, 2016 (One year) [extended upto 31.03.2018]	14.72 Lakhs
12.	Prof. A. Ray (Pharmacology) NIF-II	Experimental studies to evaluate the mode of action of traditional herbal agents in bronchial asthma	NIF July 24, 2017 (One year)	18.56 lakhs
13.	Dr Anita Kotwani (Pharmacology)	Effect of Indian almond and sweet almond in diabetes induced nephropathy and cataract in rats	AYUSH/Central Council for Research in Ayurvedic Sciences (CCRAS) January 25, 2014 (Three years) [extended upto 09.09.2017]	21.56 Lakhs
14.	Dr Kavita Gulati (Pharmacology)	Studies on the anti-inflammatory and immunomodulatory effects of *Albizzia lebbeck* and *Solanum xanthocarpum* in experimental models of bronchial asthma	DBT March 10, 2014 (Three years) [extended upto 09.09.2017]	35.63 Lakhs
15.	Dr Kavita Gulati (Pharmacology)	A clinical study to evaluate the effects of yoga on pulmonary functions, cellular and molecular markers and quality of life in patients of bronchial asthma	AYUSH October 01, 2015 (Three years)	30.04 Lakhs
16.	Dr. Kavita Gulati (Pharmacology) CCRUM-II	Experimental studies on the hepato-protechtive and immune modulatory effects of Dawa-ul-kurkum, a polyherbal Unani preparation, and its cellular and molecular mechanisms in rats	CCRUM, AYUSH September 28, 2017 (Three years)	23.57 lakh
17.	Dr. Kavita Gulati (Pharmacology) AYUSH-II	A clinical study to evaluate the effects of yogic intervention on pulmonary functions, inflammatory markers, oxidative stress and health status in patients of chronic obstructive pulmonary disease (COPD)	AYUSH March 26, 2018 (Three years)	18.12 lakhs

S. No.	Faculty Member (Department)	Title of Project	Funding Agency, Date of Sanction/ Implementation and Duration	Grants received (in ₹)
18.	Dr Vishal Bansal (Physiology)	Development of exercise protocol to improve hypoxic tolerance	DIPAS April 10, 2015 (Three years) [extended upto 08.09.2018]	45.00 Lakhs
19.	Prof. Raj Kumar (Respiratory Allergy and Applied Immunology)	Indoor air pollution and asthma exacerbation in children: a population based study	ICMR February 1, 2015 (Three years) [extended upto 31.05.2018]	180.00 Lakhs
20.	Prof. Raj Kumar (Respiratory Allergy and Applied Immunology)	National Tobacco Quit Line Tobacco Quitline Services (TQLS) at Vallabhbhai Patel Chest Institute, Delhi	Ministry of Health & Family Welfare (Govt. of India) – QL March 12, 2016 (Three years)	182.00 Lakhs
21.	Dr Raj Kumar (Respiratory Allergy and Applied Immunology)	Effect of outdoor air pollurtion on acute respiratory symtoms in Delhi: A multisite project	ICMR March 15, 2017 (One Year and three months)	23.38 Lakhs
22.	Dr Ashima Anand (Principal Investigator) DST Project	To investigate the role of J receptors as a primary causative factor leading to dysponea on exertion in patients with pulmonary hypertension (1) (i) with and (ii) without atrial septal defect and (2) with connective tissue disease	DST November 2, 2016 (Three years)	14.13 Lakhs

Fellowships

S. No.	Name of the Fellow and Name of Supervisor	Title of Fellowship	Funding Agency, Date of Sanction/ Implementation and Duration	Grants received (in ₹)
1.	Ms. Cheshta Sharma (Senior Research Fellow) *(Supervisor: Dr Anuradha Chowdhary)*	Molecular mechanism of triazole antifungal resistance in *A. fumigatus* and *A. flavus* originating from clinical and environmental sources	UGC February 27, 2012 (Five years)	13.41 Lakhs
2.	Mr. Gaurav Tyagi (Senior Research Fellow) *(Supervisor: Dr Mandira Varma-Basil)*	To study biotin metabolism in the biology of mycobacterium tuberculosis	ICMR September 14, 2012 (Five years)	18.46 Lakhs
3.	Ms. Pooja Singh (Senior Research Fellow) *(Supervisor: Dr Mandira Varma-Basil)*	Cholesterol utilisation by MCE4A overxpressed *M. tuberculosis* H37RV and effect of verapapamil	ICMR January 1, 2014 (Three years) [extended upto 23.05.2017]	16.20 Lakhs
4.	Ms. Anju Gautam (Senior Research Fellow) *(Supervisor: Dr Madhu Khanna)*	Evaluation of virus like particle (VLPs) and bacterial toxin adjuvants as vaccine candidate for influenza A virus	ICMR January 17, 2014 (Three years)	10.12 Lakhs
5.	Mr. Dibya Ranjan Pati (Senior Research Fellow) *(Supervisor: Dr Madhu Khanna)*	Nano-therapeutic application of small interfering RNA and micro RNA against human influenza virus	ICMR August 19, 2014 to February 28, 2017	11.55 Lakhs
6.	Mr. Naresh Kumar (Senior Research Fellow) *(Supervisor: Dr Mandira Varma-Basil)*	Expression analysis of genes of liquid metabolism in clinical isolates of *Mycobacterium tuberculosis* from patients of pulmonary and lymph node tuberculosis	ICMR January 05, 2015 (Three years)	12.70 Lakhs
7.	Ms Tanushri Nandi (Senior Research Fellow) *(Supervisor: Dr Madhu Khanna)*	Synergistic effect of host defensive immune peptides in regulation of influenza A virus replication	ICMR August 12, 2015 (Three years)	13.70 Lakhs
8.	Ms. Sulekha Chaudhary (Senior Research Fellow) *(Supervisor: Dr Kavita Gulati)*	Studies on the anti-inflammatory and immunomodulatory effects of *albizia lebbeck* and *solonam xanthocarpum* on the experimental model of brochial asthma	UGC July 31, 2012 (Five years)	13.41 Lakhs

S. No.	Name of the Fellow and Name of Supervisor	Title of Fellowship	Funding Agency, Date of Sanction/ Implementation and Duration	Grants received (in ₹)
9.	Mr Anil Meena (Junior Research Fellow) *(Supervisor: Prof. S.K. Bansal)*	A study on CRHR1 and GR gene polymorphism and their correlation with the expression of various inflammatory cytokines in asthma in North Indian population	ICMR January 28, 2014 (Five years)	17.18 Lakhs
10.	Mr. Pradeep Kr. Singh (Junior Research Fellow) *(Supervisor: Dr Anuradha Chowdhary)*	Molecular characterization and antifungal susceptiblity profile of non-sprulating clinically significant mouls with special reference to the filamentation basidiomycetes occurring in patient with respiratory disorders	ICMR October 07, 2015 (Three years)	13.70 Lakhs
11.	Mr. Maaz Naqvi (Junior Research Fellow) *(Supervisor: Prof. A. Ray)*	Experimental pharmacological studies for optimization of constituents of UNIM-352, a polyherbal preparation for efficacious and safe treatment of brochial asthma	ICMR March 18, 2016 (Three years)	9.14 Lakhs
12.	Mr. Vikas Kumar Solanki (Post-doctoral Fellow) *(Supervisor : Dr Mandira Varma Basil)*	A novel and improved heterologous prime-boost vaccine regimen against tuberculosis	DST July 8, 2016 to December 4, 2017	18.70 Lakhs
13.	Dr. Malachy Chigozie Ugwu (Post-doctoral Fellow) *(Supervisor : Dr Malini Shariff)*	Molecular characterization of multidrug resistant bacterial uropathogens in south-eastern Nigeria	NAM S&T Centre January 30, 2017 (Six months)	2.70 Lakhs

Conferences/Symposia/Seminars/Workshops/CMEs

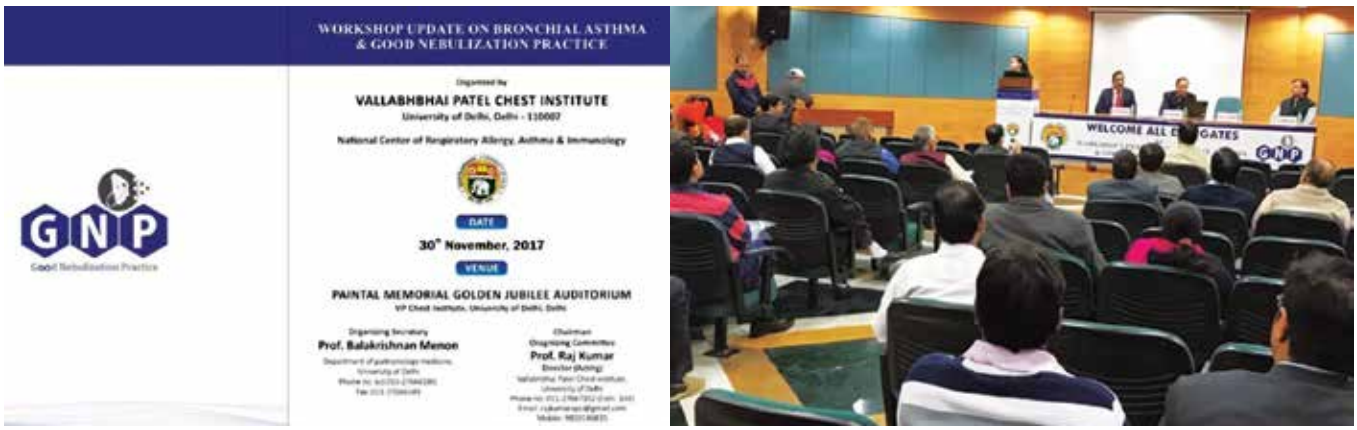
S. No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
1.	Prof. S.K. Bansal	Expert	Central Ayurveda Research Institute for Respiratory Disorders (CARIRD)	Brainstorming Workshop on Formulating the R&D Strategy on Respiratory Disorders Patiala, April 1, 2017
2.	Prof. S.K. Bansal	Chaired "Students Award Presentation"	DCISAR, GIPMER	Symposium of DC-ISAR New Delhi August 19, 2017
3.	Prof. S.K. Bansal	Chaired "Scientific Session"	VPCI, University of Delhi	Recent Advances in Nitric Oxide (NO) Research and Its Impact on Therapy Delhi September 6, 2017
4.	Prof. Raj Kumar	Participated	University Hospital Munster	Masterclass- Allergy Diagnosis and Allergen Immunothreapy Munster, Germany April 5 – 8, 2017
5.	Prof. Raj Kumar	Organizing Secretary Lectures on • Food allergy in bronchial asthma • Allergy prevention strategies Hands on Practical Training- SPT	National Center of Respiratory Allergy, Asthma and Immunology and Institute of Genomics and Integrative Biology	42nd Workshop on Respiratory Allergy: Diagnosis and Management Delhi April 24-28, 2017

42nd workshop on "Respiratory Allergy: Diagnosis and Management" was organised by National Center of Respiratory Allergy, Ashtma and Immunology (NCRAAI), V.P. Chest Institute, Delhi in association with Institute of CSIR-Genomics and Intergative Biology, Delhi, held from April 24-27, 2017. During the workshop a *Training Manual* and *Altas of Common Respiratory Allergies* were released (upper panel); hands on training to participating delegates for SPT, etc. was also given (below panel)

S. No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
6.	Prof. Raj Kumar	Organizing Secretary Guest Lecture on Asthma	VPCI, University of Delhi	World Asthma Day 2017 Delhi May 2, 2017
7.	Prof. Raj Kumar	Guest Lecture on Experience of Tobacco Quit line in India	National Institute of Cancer Prevention and Research, Noida	WHO FCTC Global Knowledge Hub on SLT New Delhi August 16-18, 2017
8.	Prof. Raj Kumar	Guest Lectures on • Allergy management: evidence from the last decade • Allergen immunothearpy' in allergy diagnosis and allergen immunotherarpy	AIIMS, New Delhi	Workshop - Scientific Session Agenda New Delhi August 20, 2017
9.	Prof. Raj Kumar	Participated	National College of Chest Physician (NCCP) and Indian Chest Society (ICS)	19th Joint National Conference of the National College of Chest Physicians (NCCP) and Indian Chest Society (ICS) NAPCON - 2017 Science City, Kolkata November 16-19, 2017
10.	Prof. Raj Kumar	Organizing Chairman Guest Lecture on Inhaled devices	VPCI, University of Delhi	Workshop on Good Inhalation Therapy Practices for Nursing Staff Delhi November 27-29, 2017
11.	Prof. Raj Kumar	Organizing Chairman	VPCI, University of Delhi	Workshop on Update on Bronchial Asthma & Good Nebulization Practice Delhi November 30, 2017
12.	Prof. Raj Kumar	Organizing Chairman Moderator on Panel Discussion Implementing AIT protocol for aero-allergens Chairperson in a Discussion on Controversies in allergen immunotherapy – Best way forward Guest Lectures on • Clinical cases discussion • Allergen immunotherapy for allergic asthma • Patient selection for allergen immunotherapy • Closing remarks	VPCI, University of Delhi	1st Indian Summit on Allergy Diagnosis and Allergen Immunotherapy Delhi December 8-9, 2017

S. No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
13.	Prof. Raj Kumar	Participated	The Tuberculosis Association of India	68th TB Seal Sale Campaign for the National Capital Territory of Delhi Delhi December 15, 2017
14.	Prof. Raj Kumar	Guest of Honour	Dr Bhim Rao Ambedkar College, University of Delhi, Delhi and South Asian Management Association	International Conference on Strategies for Promoting Inclusive Development Delhi March 17, 2018

A workshop on Good Inhalation Therapy Practices for Nursing Staff was held on November 27 and 29, 2017. Releasing of the workshop Souvenir (Right panel above); Dr Nitin Goel, Department of Pulmonary Medicine of the Institute showing correct way to use nebulizer to the participants (Left panel below); some of the participants of the workshop (Right panel below)



A Workshop on Update on Bronchial Asthma and Good Nebulization Practice was held on November 30, 2017

S. No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
15.	Dr Malini Shariff	Participated	Indian Association of Medical Microbiologists (Delhi Chapter)	CME on Microscopy to Microarray: Reducing Time to Diagnosis New Delhi December 8, 2017
16.	Dr Malini Shariff	Participated	Indian Association of Medical Microbiologists (Delhi Chapter)	9th Annual Conference of Indian Association of Medical Microbiologists (Delhi Chapter) New Delhi December 9, 2017
17.	Dr Malini Shariff	Participated	Probiotic Association of India	4th Biennial Conference of PAI and International Symposium on Probiotic Therapy: Translating to Health and Clinical Practice AIIMS, New Delhi Feruary 16-17, 2018
18.	Dr Malini Shariff	Participated	Vardhaman Medical College and Safdarjung Hospital	National Hospital Waste Conference cum Workshop New Delhi March 26-27, 2018
19.	Dr Mandira Varma-Basil	Lecture on Contribution of efflux pumps in rifampicin resistance in clinical isolates of *M. tuberculosis*	European Society of Mycobacteriology	38th Annual Congress of European Society of Mycobacteriology Sibenik, Croatia June 25-28, 2017
20.	Dr Mandira Varma-Basil	Talk on Efflux pumps: how important are they for resistance in *M. tuberculosis*	Euroscicon	Webinar Euroscicon: Fighting Back Against Infectious Diseases UK September 6, 2017
21.	Dr Mandira Varma-Basil	Lecture on Changing landscape of clinical microbiology	Division of Biochemistry, Indian Agricultural Research Institute	Tools and Techniques for Analysis of Biomolecules New Delhi September 14, 2017
22.	Dr Mandira Varma-Basil	Lecture on Recent developments in molecular diagnosis of tuberculosis	Miranda House, University of Delhi	Add on Certificate Course in Biotechnology Delhi October 4, 2017
23.	Dr Anuradha Chowdhary	Guest Lecture on *Candida auris:* an emerging global infectious threat	Dutch Society for Microbiology	Annual Meeting of the Dutch Society for Microbiology Papendal Netherlands April 11-12, 2017

S. No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
24.	Dr Anuradha Chowdhary	Presented poster on *In vitro* AFST by CLSI and EUCAST brouth dilution method and ?utidation of molecular mechanism in 350 Indian *C. auris* isolates	American Society of Microbiology	ASM Microbe New Orleans, USA June 1-5, 2017
25.	Dr Anuradha Chowdhary	Guest Lecture on *Candida auris:* an emerging fungal pathogen Lecture on *Candida auris*: from ear colonisation to fungemia Presented poster on *Penicillium* spp and *Talaromyces* spp distribution in clinical samples in a chest hospital in Delhi, India: characterization by molecular methods and MALDI TOF-MS and their antifungal susceptibility profiles	European Confederation of Medical Mycology (ECMM)	8th Trends in Medical Mycology Belgrade, Serbia October 6-9, 2017
26.	Dr Anuradha Chowdhary	Guest Lecture on Global epidemiology of azole resistance in *Aspergillus* Lecture on Global epidemiology of azole resistance in *Aspergillus* Presented a poster on Multiple resistance mechanisms in both clinical and environmental azole resistant *Aspergillus fumigatus* isolates in India	International Society for Human and Animal Mycology	8th Advances Against Aspergillus Lisbon, Portugal February 1-3, 2018
27.	Dr Madhu Khanna	Presented a poster on Suramin: a potent ameliorating agent to inhibit influenza A virus replication	ISIRV Antiviral Group	5th ISIRV-AVG Conference on Prevention and Treatment of RVIs: Antivirals, Traditional Therapies and Host-Directed Interventions Shanghai, China June 14-16, 2017
28.	Dr Anita Kotwani	Delivered a talk on One-health approach to combat antimicrobial resistance: overview of global and National Action Plan	Indian Pharmacological Society	Golden Jubilee – Indian Pharmacological Society Conference, NRIPSCON Ghaziabad, Uttar Pradesh September 1-2, 2017
29.	Dr Anita Kotwani	Delivered a talk on Antimicrobial resistance: impact on pharmacovigilance	Indian Pharmacopoeia Commission	National Coordination Centre – Pharmacovigilance Programme of India NCC-PvPI, Ghaziabad September 22, 2017

S. No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
30.	Dr Anita Kotwani	Participated as a Member	Department of Biotechnology	India-UK sandpit Anti-Microbial Resistance Meeting Taj Damdama, Haryana November 7-10, 2017
31.	Dr Anita Kotwani	Participated in roundtable meet	The London School of Hygiene and Tropical Medicine	Metrics and Methods for Assessing Antibiotic Use at the Granular Level in Humans and Livestock in Low and Middle Income Countries London, UK November 21-22, 2017
32.	Dr Anita Kotwani	Participated	Delhi Society for Promotion of Rational Use of Drugs	Workshop on Antibiotic Stewardship Program to Combat Antibiotic Resistance New Delhi November 27-28, 2017
33.	Dr Anita Kotwani	Expert	Netherland Embassy	Interactive Workshop on the Challenge of Anti Microbial Resistance Related to Waste Water Discharge from Pharmaceutical Industry and Hospitals The Netherland Embassy, New Delhi February 14, 2018
34.	Dr Anita Kotwani	Delivered a talk on Surveillance of antibiotic use: Essential for containment of AMR	Indian Pharmacological Society	Annual Conference of Indian Pharmacological Society, IPSCON 2017 Mumbai February 15-17, 2018
35.	Dr Anita Kotwani	Participated	Faculty of Social Science, Jamia Milia Islamia	Evidence Synthesis of Qualitative and Mixed Methods Research Under the Indo-US 21st Century Knowledge Initiative Projects New Delhi February 19-25, 2018
36.	Dr Anita Kotwani	Delivered a talk on Drug utilization studies of antimicrobials	Postgraduate Institute of Medical Education & Research, Chandigarh	35th National Workshop on Clinical Pharmacology Chandigarh March 17, 2018
37.	Dr Anita Kotwani	Delivered a talk and interaction with school teachers on Use and misuse of antibiotics in the community	Silver Line Prestige School	Silver Line Prestige School Ghaziabad, Uttar Pradesh March 31, 2018

S. No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
38.	Dr Kavita Gulati	Participated	RML Hospital New Delhi	Workshop-cum-Training Program on Ethics in Human Health Research and Good Clinical Practice New Delhi April 18, 2017
39.	Dr Kavita Gulati	Invited talk on Adaptogenic effects of Unani herbs and gastric cyto-protection: molecular mechanisms Chairperson	International Union of Basic and Clinical Pharmacology (IUPHAR)	IUPHAR-GI Section Meeting Novigrad, Croatia June 8-10, 2017
40.	Dr Kavita Gulati	Invited talk on Pharmacovigilance : a tool for drug safety	B.R. Ambedkar Centre for Biomedical Research, University of Delhi, Delhi	Summer Undergraduate Research Programme (SURP-2017) Delhi July 2, 2017
41.	Dr Kavita Gulati	Invited talk on The process of reporting ADRs	Indian Pharmacopoeia Commission, National Coordination Centre-Pharmacovigilance Program of India (PvPI), Ministry of H & FW, Government of India	Skill Development Programme on Basic and Regulatory Aspects of Pharmacovigilance: Striving for Excellence Ghaziabad, Uttar Pradesh July 4, 2017
42.	Dr Kavita Gulati	Participated	ICMR-National Aids Research Institute/ Moving Academy of Medicine and Biomedicine,	Workshop on Clinical and Laboratory Medicine Research Pune August 28, 2017 – September 2, 2017
43.	Dr Kavita Gulati	Organising Secretary	VPCI and Society of Nitric Oxide and Allied Radicals (SNOAR)	Symposium on Recent advances in Nitric oxide (NO) Research and Impact on Therapy Delhi September 6, 2017
44.	Dr Kavita Gulati	Invited talk on Introduction to adverse monitoring center (AMC) and its activities	Indian Pharmacopoeia Commission	5th Skill Development Program of Indian Pharmacopoeia Commission Delhi September 9, 2017
45.	Dr Kavita Gulati	Chairperson and Treasurer	VPCI	Workshop on Advancement in Immunology Delhi October 12-13, 2017
46.	Dr Kavita Gulati	Invited talk on Evaluation of methylxanthine induced cardiotoxicity: a translational approach	Central Drug Research Institute	International Symposium on Molecular Medicines for Lifestyle Diseases: Emerging Targets and Approaches Lucknow November 20-21, 2017

S. No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
47.	Dr Kavita Gulati	Participated	AIIMS Delhi, THSTI (DBT) & PATH	Brainstorming Workshop on 'Principles and Applications of Pharmacoeconomics New Delhi November 29, 2017
48.	Dr Kavita Gulati	Invited talk on The process of reporting ADRs	Indian Pharmacopoeia Commission, National Coordination Centre-Pharmacovigilance Program of India (PvPI), Ministry of H & FW, Government of India	Skill Development Programme on Basics and Regulatory Aspects of Pharmacovigilance: Optimising Medicine Safety is our Goal Ghaziabad, Uttar Pradesh January 15-24, 2018
49.	Dr Kavita Gulati	Lectures on • Experimental studies to evaluate the mode of action of traditional polyherbal preparation in bronchial asthma • Translational research on drug safety in respiratory disorders: focus on methylxanthines	Zakir Husain Delhi College, New Delhi,	National Conference on Diseases and Drugs: Emerging Trends and Challenges New Delhi January 31- February 1, 2018
50.	Dr Kavita Gulati	Chairperson	Delhi Pharmaceutical Sciences and Research University (DPSRU)	International Conference on Challenges for Global Competitiveness of AYUSH and Natural Products Delhi February 2-4, 2018
51.	Dr Kavita Gulati	Invited talk on Experimental and clinical studies on methylxanthine induced cardiotoxicity for ensuring drug safety	Madurai University and Academy of Cardio-vascular Sciences (India section)	10th International Conference on Recent advances in Cardiovascular Sciences Madurai Feburary 8-10, 2018
52.	Dr Kavita Gulati	Invited talk on Complementary role of yogic intervention in the management of obstructive airway disease Lectures on • Experimental studies to evaluate the immuno-modulatory and anti-inflammatory potential of optimized polyherbal preparation of asthma in rats • A clinical study to evaluate the effects of yogic intervention on pulmonary functions, inflammatory marker and health status in patients of chronic obstructive pulmonary disease (COPD)	NMIMS	Golden Jubilee Concluding Celebrations & 50th Annual Conference of Indian Pharmacological Society (IPSCON-2017) Mumbai February 15-17, 2018

S. No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
53.	Dr Kavita Gulati	Guest Faculty Invited talk on Adverse event reporting and causality assessment	Dr RML Hospital – PGIMER	Workshop on Ethics in Human Health Research and Good Clinical Practices New Delhi March 28, 2018
54.	Dr Vishwajeet Rohil	Invited and delivered five lectures and demo on various research and diagnostic techniques at VPCI • Blood diagnosis • Anaemia • Regulation, estimation and interpretation of blood sugar, urea, creatinine, cholesterol and bilirubin • Urine diagnosis • Lipoproteins, their function and role in health and disease	Department of Chemistry Daulat Ram College University of Delhi	Faculty Development Programme, From Chemistry of Life to Chemistry of Diseases: Understanding Clinical Biochemistry Delhi June 15-21, 2017
55.	Dr Vishwajeet Rohil	Participated	Moving Academy of Medicine and Biomedicine, Pune in collaboration with ICMR-National AIDS Research Institute, Pune sponsored by DHR, MoHFW, GOI at ICMR-NARI/MAMB, Pune	Workshop on Clinical and Laboratory Medicine Research Pune August 28 – September 2, 2017

Workshop on Clinical and Laboratory Medicine Research organised by Moving Academy of Medicine and Biomedicine, Pune in collaboration with ICMR-National AIDS Research Institute, Pune sponsored by DHR, MoHFW, GOI at ICMR-NARI/MAMB, Pune, held from August 28 to September 2, 2017. Faculty members of the Institute in the picture are: Dr Kavita Gulati (Pharmacology), Dr Vishwajeet Rohil (Biochemistry)and Dr Ritu Kulshreshtha (Pathology).

56.	Dr Vishwajeet Rohil	Invited talk on The role of calreticulin transacetylase mediated epigenetic modulation by polyphenolic acetates in lung tumour suppression	Kolkata Health Care Summit – 2017, Raythean Health Care	World Cancer Congress-2017 Kolkata September 20-22, 2017

S. No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
57.	Dr Vishwajeet Rohil	Presented a paper on Anti-cancer activity of polyphenolic acetates mediated by calreticulin transacetylase in lung cancer: an epigenetic modulation	Science and Cancer Therapy – 2017	25th World Congress on Cancer & Science and Therapy Baltimore, Maryland, USA October 18-20, 2017
58.	Dr Vishwajeet Rohil	Co-chaired the Session on PSI Orations Invited Speaker and delivered his innovative research work on Novel epigenetic drugs: polyphenol acetates, putative second-generation drugs for lung cancer	Defence Institute of Physiology & Allied Sciences	FIPSPHYSICON 2017 Delhi November 6-7, 2017

Dr Vishwajeet Rohil (Biochemistry) felicitated by The Director, DIPAS, DRDO for his scientific talk at FIPSPHYSICON 2017 on November 5-7, 2017

Dr Vishwajeet Rohil (Biochemistry) addressing Question-Answer Session after his oral presentation entitled, Anti-cancer activity of polyphenolic acetates mediated by calreticulin transacetylase in lung cancer: an epigenetic modulation at 25th World Congress on Cancer & Science and Therapy held from October 18-20, 2017 at Baltimore, Maryland, USA

59.	Dr Ritu Kulshrestha	Guest Lecture on EGFR mutations from blood and tissue of Stage 3 and 4 lung cancer patients from Indian population	Asia Pacific International Academy of Pathology, Indonasian Association of Pathologists and International Academy of Pathology	10th Asia Pacific International Academy of Pathology Bali, Indonesia April 24-26, 2017
60.	Dr Ritu Kulshrestha	Guest Lecture on Non neoplastic lesions of the lung: bronchoscopic biopsies and their interpretation	PSG Institute of Medical Sciences and Research	CME - Melange of Non - Neoplastic Pathology Coimbatore October 27-28, 2017

S. No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
61.	Dr Ritu Kulshrestha	Presented a paper on Designing of inhalation based polymeric nanoparticle drug delivery systems for the treatment of lung fibrosis	DBT, Indian Society of Nano Medicine, IISER (Trivendrum) and AIIMS, New Delhi	2nd Annual conference of Indian Society of Nanomedicine (ISNM) Nanobiotek-2017 Trivandrum December 6-8, 2017
62.	Dr Ritu Kulshrestha	Presented a paper on bFGF/FGFR-1,2 signalling pathway during the remodelling of pulmonary extracellular matrix	Department of Pathology, Tata Medical Center, Kolkata in collaboration with ISIMM, California, USA and Nordic Immunohisto- chemical Quality Control (NordiQC), Aalborg, Denmark	International Symposium on Immunohistochemistry Kolkata January 4-7, 2018
63.	Dr Ritu Kulshrestha	Guest Lecture on Tumour dedifferentiation and interstitial lung disease are indicators of poor prognosis in advanced stage papillary adenocarcinoma of lung treated with gefitinib	National Health Research Institute, Taiwan and Asia-Australasia Pulmonary Pathology Society, Taiwan	5th Annual Conference of Asia-Australasia Pulmonary Pathology Society Taipei, Taiwan March 31- 1 April, 2018
64.	Dr Vishal Bansal	Lecture on Pulmonary rehabilitation for physiotherapists	Sri Lanka College of Pulmonologists	Pre-congress Workshop of Annual Academic Sessions of Sri Lanka College of Pulmonologists – RESPIRE-IX Colombo, Sri Lanka July 6, 2017
65.	Dr Vishal Bansal	Lectures on • Assessing respiratory fitness in special situations • Role of Pulmonary rehabilitation in the management of ILD	Sri Lanka College of Pulmonologists	Annual Academic Sessions of Sri Lanka College of Pulmonologists – RESPIRE-IX Colombo, Sri Lanka July 7-8, 2017
66.	Dr Vishal Bansal	Lecture on Role of exercise training in management of chronic respiratory diseases	Department of Zoology, Sri Venkateswara University, Tirupati and Defence Institute of Physiology and Allied Sciences (DRDO) Delhi	New Horizons in Exercise and Health:-NHEH-2017 Tirupati, Andhra Pradesh August 4-5, 2017

S. No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
67.	Dr Vishal Bansal	Lecture on Treat the muscles to treat the lungs: exercise training in chronic respiratory diseases Presented a poster on Cardiac autonomic dysfunction in chronicobstructive pulmonary diseasepatients and its association with depression	Federation of Indian Physiological Societies (FIPS), Physiological Society of India (PSI) and Defence Institute of Physiology and Allied Sciences (DRDO) Delhi	VII Congress of Federation of Indian Physiological Societies (FIPS) and XXIX Annual Conference of Physiological Society of India (PSI)-FIPSPHYSIOCON-2017 Delhi November 5-7, 2017
68.	Dr Vishal Bansal	Lecture on Role of epithelium in the airway responses to hyperosmotic solutions in normal and sensitized guinea pigs	Indian Science Congress Association Kolkata, West Bengal and Manipur University, Imphal, Manipur	105th Indian Science Congress: Reaching the Unreached Through Science & Technology Imphal, Manipur March 16-20, 2018

Dr Vishal Bansal (Physiology) presented a lecture on Role of Epithelium in the Airway Responses to Hyperosmotic Solutions in Normal and Sensitized Guinea Pigs at 105th Indian Science Congress: Reaching the Unreached Through Science & Technology, held from March 16-20, 2017, organised jointly by Indian Science Congress Association, Kolkata, West Bengal and Manipur University, Imphal, Manipur

69.	Dr Anshu Priya (MD Student)	Presented a poster on The bidirectional association between asthma and OSA	Czech Society for Sleep Research and Sleep Medicine	World Sleep Congress-2017 Prague, Czech Republic October 7-11, 2017
70.	Dr Naveen Vennilavan R (MD Student)	Presented a poster on COPD: chronic pulmonary aspergillosis	PGIMS, Rohtak	Obstructive Airway Diseases and NIV Rohtak, Haryana February, 2017

S. No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
71.	Ashutosh Singh (PhD Student)	Presented posters on • Multigene phylogeny and matrix-assisted laser desorption ionization time-of-flight mass spectrometry identification of indian clinical isolates of *Pseudallescheria/Scedosporium* spp. complex and their susceptibility patterns • *In vitro* activity of the new azole luliconazole and eleven other antifungal drugs against molecularly characterized clinical fusarium isolates	American Society of Microbiology	ASM Microbe New Orleans, USA June 1-5, 2017

Participation in Advanced and Specialised Training Programme by Faculty Members

S. No.	Participant (Department)	Course Title/ Topic	Training Duration	Host
1.	Dr Vishwajeet Rohil (Biochemistry)	Workshop on Clinical and Laboratory Medicine Research	August 28 – September 2, 2017	Moving Academy of Medicine and Biomedicine, Pune in collaboration with ICMR-National AIDS Research Institute, Pune and Department of Health Research, MOHFW, GOI
2.	Dr Ritu Kulshrestha (Pathology)	Workshop on Clinical and Laboratory Medicine Research	August 28 – September 2, 2017	Moving Academy of Medicine and Biomedicine, Pune in collaboration with ICMR-National AIDS Research Institute, Pune and Department of Health Research, MOHFW, GOI
3.	Dr Vishal Bansal (Physiology)	Defining Molecular Drivers of Ageing and Their Implications in Related Diseases	November 18, 2017	Department of Physiology, Maulana Azad Medical College, New Delhi

Short-term Specialised Training Imparted by Faculty Members

S. No.	Name, Subject and University/Institute/College	Course Title/ Topic	Faculty Member (Department)	Period
1.	Ms Kriti Singhal BTech + MTech (Dual) (Biotechnology) Amity Institute of Biotechnology, Amity University, Noida, Uttar Pradesh	Techniques in biochemistry	Prof. S.K. Bansal (Biochemistry)	May 22 - July 07, 2017
2.	Ms Mahika Gera Ms Aparna Chauhan M.Sc (Biotechnology) Amity Institute of Biotechnology, Amity University, Noida, Uttar Pradesh	Techniques in biochemistry	Prof. S.K. Bansal (Biochemistry)	May 22 - July 07, 2017
3.	Ms Amrita Nandi MSc (Biochemistry) Kurukshetra University, Kurukshetra (Haryana)	Techniques in biochemistry	Prof. S.K. Bansal (Biochemistry)	June 1 - June 30, 2017
4.	Ms Reevanshi Sharma BSc (Biochemistry) Institute of Home Economics, University of Delhi, Delhi	Techniques in biochemistry	Prof. S.K. Bansal (Biochemistry)	June 1 - June 30, 2017
5.	Ms Prerna Priyadarshini MTech (Biotechnology) Amity Institute of Biotechnology, Amity University, Noida, Uttar Pradesh	Clinical biochemistry/ biotechnology	Dr Vishwajeet Rohil (Clinical Biochemistry)	May 15 - July 9, 2017
6.	Mr Nawaz Alam Mr Mohd Anas BTech (Biotechnology) Jaypee Institute of Information Technology, Noida , Uttar Pradesh	Clinical biochemistry/ biotechnology	Dr Vishwajeet Rohil (Clinical Biochemistry)	June 5 - July 21, 2017
7.	Ms Mehak Chugh Ms Antra Mittal MSc (Medical Biotechnology) Amity Institute of Biotechnology, Amity University, Noida, (UP)	Clinical biochemistry/ biotechnology	Dr Vishwajeet Rohil (Clinical Biochemistry)	June 1 - July 1, 2017
8.	Mr Kushagra Prasad Mr Lokesh BTech (Bioinformatics) SRM University, Delhi-NCR, Sonepat, Haryana	Clinical biochemistry/ biotechnology	Dr Vishwajeet Rohil (Clinical Biochemistry)	June 19 - July 19, 2017

S. No.	Name, Subject and University/Institute/College	Course Title/ Topic	Faculty Member (Department)	Period
9.	Ms Sapna MSc (Biotechnology) ITS Paramedical College Muradnagar, Ghaziabad, Uttar Pradesh	Clinical biochemistry/ biotechnology	Dr Vishwajeet Rohil (Clinical Biochemistry)	July 24 - August 23, 2017
10.	Dr Malachy Ugwu (Microbiology) Department of Phamaceutical, Microbiology and Biotechnology Nnamdi Azikiwe University, Nigeria	Phenotypic and molecular characterisation of multidrug resistant baterial uropathogens in South-eastern Nigeria	Dr Malini Shariff (Microbiology)	February 2017 - July 2017
11.	Ms Geeta Kashyap MSc (Biotechnology) Multanimal Modi (PG) College, Modinagar, Ghaziabad (Uttar Pradesh)	Quantification of nontuberculous mycobacteria from direct clinical samples using real-time PCR assay	Dr Mandira Varma-Basil (Microbiology)	February 2017 - July, 2017
12.	Ms Deepshikha MSc (Biotechnology) Multanimal Modi (PG) College, Modinagar, Ghaziabad (Uttar Pradesh)	Genotypic characterisation of INH resistant *Mycobacterium tuberculosis* isolates	Dr Mandira Varma-Basil (Microbiology)	February 2017 - July, 2017
13.	Mr Deepak Tripathi Ms Aanchal Mr Sachin Tomer Mr Sanjeev Singh Ms Simran Khan BSc (Hons) Biotechnology IMS Ghaziabad (Uttar Pradesh)	Training on pathology techniques	Dr Ritu Kulshrestha (Pathology)	July 3 - August 31, 2017
14.	Ms Saakshi Saini (MSc Biomedical Sciences) Dr B.R. Ambedkar Center for Biomedical Research, University of Delhi, Delhi	Training on pathology techniques	Dr Ritu Kulshrestha (Pathology)	December 20, 2016 - May 20, 2017
15.	Ms Priyanka Verma (MSc Biotechnology) Amity Institute of Biotechnology, Amity University, Noida, (UP)	Allergy testing and immunological diagnosis of ABPA	Prof. Raj Kumar (Pulmonary Medicine)	Februray 9 - April 9, 2018
16.	Ms Meenu Raghav (MSc Biotechnology) Amity Institute of Biotechnology, Amity University, Noida, (UP)	Allergy testing to detect common aero-allergens and immunological diagnosis of respiratory disorders	Prof. Raj Kumar (Pulmonary Medicine)	Februray 9 - April 9, 2018

Public Lecture Series

To educate general public at large about common diseases, their treatments, myths, people sufferings and to clear their doubts, Institute conducted Public Lectures regularly. During the year, following lectures were held: (1) Effect of Air Pollution on Lungs on November 24, 2017; (2) Harmful Effect of Tobacco & How to Quit Tobacco on December 14, 2017; (3) Awareness of Tuberculosis: An Age Old Menace on December 29, 2017; (4) Use and Misuse of Antibiotics on January 30, 2018 and (5) Asthma: Causes, Diagnosis and Treatment February 28, 2018

Effect of Air Pollution on Lungs

Harmful Effect of Tobacco and How to Quit Tobacco

Awareness of Tuberculosis: An Age Old Menace

Use and Misuse of Antibiotics

Asthma: Causes, Diagnosis and Treatment

Cultural and Sports Activities

The Institute conducted the VPCI Sports and Cultural Activity Programme from 29th December 2017 to 7th January 2018. It was inaugurated by Prof. Raj Kumar, Director (Acting), VPCI. The Sports events include: Musical Chair, Table Tennis, Badminton, Bench Press (Weight Lifting), Carom and Chess; and the Cultural events include: Play, Dance, Vocal Music, Instrumental Music and Poem Recitation. Most of the staff members, students and family members of VPCI were participated in this Programme. The Institute distributed Trophies and Certificates (First, Second and Third) to the winners. The staff members of the Institute had also participated in various events of the Annual Tournament of Delhi University Staff Club.

Institute maintained its tradition to celebrate Independence Day (August 15, 2017) and Republic Day (January 26, 2018)

Sports and cultural events were organised at the Institute with active participation from all. Poem recitation and mono-acting, etc are shown in the pictures performed by the staff and children of the families of staff members. Prizes were distributed to the winners of the sports events and to the participants of cultural programme

List of Publications

Journals

1. Aditi, Shariff Malini, Beri Kiran. Exacerbation of bronchiectasis by *Pseudomonas monteilii:* a case report. *BMC Infect Dis* 2017;17:511.
2. Aditi, Shariff Malini, Chhabra Sunil K, Rahman M. Similar virulence properties of infection and colonization associated *Pseudomonas aeruginosa. J Med Microbiol* 2017;66:1489-98.
3. Aggarwal Taru, Wadhwa Ridhima, Rohil Vishwajeet, Kumar Pawan. Biomarkers of oxidative stress and protein-protein interaction in chronic obstructive pulmonary disease. *Arch Physiol Biochem* 2017, published online DOI: 10.1080/13813455.2017.1387796. *Available at URL:* http://www.tandfonline.com/loi/iarp20PMID:29020824
4. Arendrup MC, Prakash A, Meletiadis J, Sharma C, Chowdhary A. Comparison of EUCAST and CLSI reference microdilution MICs of eight antifungal compounds for *Candida auris* and associated tentative epidemiological cutoff values. *Antimicrob Agents Chemother* 2017;61:e00485-17.
5. Ashu EE, Hagen F, Chowdhary A, Meis JF, Xu J. Global population genetic analysis of *Aspergillus fumigatus. mSphere* 2017;2:e00019-17.
6. Behl T, Kotwani A. Omega-3 fatty acids in prevention of diabetic retinopathy. *J Pharm Pharmacol* 2017;69:946–54.
7. Behl T, Kotwani A. Potential of angiotensin II receptor blockers in the treatment of diabetic retinopathy. *Life Sci* 2017;176:1–9.
8. Behl T, Kotwani A. Anti-hyperglycemic effect of terminalia catappa fruit extract in streptozotocin-induced diabetic rats. *Int J Pharm Pharm Sci* 2017;9: 212–7.
9. Behl T, Velpandian T, Kotwani A. Role of altered coagulation-fibrinolytic system in the pathophysiology of diabetic retinopathy. *Vascular Pharmacol* 2017;92:1–5.
10. Chaudhary Jyothi, Shariff Malini, Deb Monorama. Evaluation of polymerase chain reaction for direct detection of *Streptococcus pneumoniae* in clinical samples and antomicrobial susceptibility of the isolates. *Int J Res Health Sci* 2017;5:43–48.
11. Chaudhry R, Valavane A, Sreenath K, Choudhary M, Sagar T, Shende T, Varma-Basil M, Mohanty S, Kabra SK, Dey AB, Thakur B. Detection of *Mycoplasma pneumoniae* and *Legionella pneumophila* in patients having community-acquired pneumonia: a multicentric study from New Delhi, India. *Am J Trop Med Hyg* 2017;97:1710–16.
12. Chowdhary A, Hagen F, Sharma C, Al-Hatmi AMS, Giuffrè L, Giosa D, Fan S, Badali H, Felice MR, de Hoog S, Meis JF, Romeo O. Whole genome-based amplified fragment length polymorphism analysis reveals genetic diversity in *Candida africana. Front Microbiol* 2017;8:556.
13. Chowdhary A, Meis JF. Emergence of azole resistant *Aspergillus fumigatus* and one health: time to implement environmental stewardship. *Environ Microbiol* 2018;20:1299–301.
14. Chowdhary A, Sharma C, Meis JF. *Candida auris:* a rapidly emerging cause of hospital-acquired multidrug-resistant fungal infections globally. *PLoS Pathog* 2017;13:e1006290.
15. Chowdhary A, Sharma C, Meis JF. Azole-resistant aspergillosis: epidemiology, molecular mechanisms, and treatment. *J Infect Dis* 2017;216:S436–S444.
16. Defosse TA, Le Govic Y, Vandeputte P, Courdavault V, Clastre M, Bouchara JP, Chowdhary A, Giglioli-Guivarc'h N, Papon N. A synthetic construct for genetic engineering of the emerging pathogenic yeast *Candida auris. Plasmid* 2018;95:7–10.
17. Dubey H, Gulati K, Ray A. Effects of nitric oxide (NO) modulators on cognitive function and brain oxidative stress in experimental model of Alzheimer's disease in rats. *J Pharmacol Rep* 2017;2.2: 1–7.

18. Dubey H, Gulati K, Ray A. Recent studies on cellular and molecular mechanisms in Alzheimer's disease: focus on epigenetic factors and histone deacetylase. *Rev Neurosci* 2018;29:241–60.

19. Dubey H, Gulati K, Ray A. Amelioration by nitric oxide (NO) mimetics on neurobehavioral and biochemical changes in experimental model of Alzheimer's disease in rats. *Neurotoxicol* 2018;66:58–65.

20. Espinel-Ingroff A, Abreu DPB, Almeida-Paes R, Brilhante RSN, Chakrabarti A, Chowdhary A, Hagen F, Córdoba S, Gonzalez GM, Govender NP, Guarro J, Johnson EM, Kidd SE, Pereira SA, Rodrigues AM, Rozental S, Szeszs MW, Ballesté Alaniz R, Bonifaz A, Bonfietti LX, Borba-Santos LP, Capilla J, Colombo AL, Dolande M, Isla MG, Melhem MSC, Mesa-Arango AC, Oliveira MME, Panizo MM, Pires de Camargo Z, Zancope-Oliveira RM, Meis JF, Turnidge J. Multicenter, international study of MIC/MEC distributions for definition of epidemiological cutoff values for Sporothrix species identified by molecular methods. *Antimicrob Agents Chemother* 2017;61:e01057.

21. Espinel-Ingroff A, Turnidge J, Alastruey-Izquierdo A, Dannaoui E, Garcia-Effron G, Guinea J, Kidd S, Pelaez T, Sanguinetti M, Meletiadis J, Botterel F, Bustamante B, Chen YC, Chakrabarti A, Chowdhary A, Chryssanthou E, Córdoba S, Gonzalez GM, Guarro J, Johnson EM, Kus JV, Lass-Flörl C, Linares-Sicilia MJ, Martín-Mazuelos E, Negri CE, Pfaller MA, Tortorano AM. Posaconazole MIC distributions for *Aspergillus fumigatus* species complex by four methods: Impact of cyp51a mutations on estimation of epidemiological cutoff values. *Antimicrob Agents Chemother* 2018;62:e01916-17.

22. Fakhim H, Chowdhary A, Prakash A, Vaezi A, Dannaoui E, Meis JF, Badali H. *In vitro* interactions of echinocandins with triazoles against multidrug-resistant *Candida auris*. *Antimicrob Agents Chemother* 2017;61:e01056.

23. Gaur SN, Kumar R, Singh AB, Agarwal MK, Arora N. Guidelines for practice of allergen immunotherapy in India: 2017-An update. *Indian J Allergy Asthma Immunol* 2017;31:3–33.

24. Giri A, Gupta S, Safi H, Narang A, Shrivastava K, Kumar Sharma N, Lingaraju S, Hanif M, Bhatnagar A, Menon B, Alland D, Varma-Basil M. Polymorphisms in Rv3806c (ubiA) and the upstream region of embA in relation to ethambutol resistance in clinical isolates of Mycobacterium tuberculosis from North India. *Tuberculosis (Edinb)* 2018;108:41–46.

25. Gulati K, Babita, Kumar Raj, Menon BK, Ray A. A clinical study to evaluate the effects of yogic intervention on pulmonary functions, inflammatory marker and quality of life in patients of bronchial asthma. *Pharmacol Toxicol* 2017;3.6:174–81.

26. Gulati K, Rai N, Ray A. Status of research in respiratory pharmacology in India during the last five years (2012-2017). *Proc Indian Natl Sci Acad* 2018;84:55–72.

27. Gupta Tanushree B, Shariff Malini, Thukral SS. Identification of AmpC β-lactamase- producing clinical isolates of *Escherichia coli. Asian J Pharm Clin Res* 2017;10:357–61.

28. Holloway KA, Kotwani A, Batmanabane G, Puri M, Tisocki K. Antibiotic use in South East Asia and policies to promote appropriate use: reports from country situational analyses. *BMJ 2017;358:j2291 doi:* 10.1136/bmj.j2291

29. Moiz JA, Bansal Vishal, Noohu MM, Gaur SN, Hussain ME, Anwer S, Alghadir Ahmad. Activities-specific balance confidence scale for predicting future falls in Indian older adults. *Clin Inter Aging* 2017;12:645–51

30. Joon D, Nimesh M, Varma-Basil M, Saluja D. Evaluation of improved IS6110 LAMP assay for diagnosis of pulmonary and extra pulmonary tuberculosis. *J Microbiol Methods* 2017;139:87–91.

31. Khurana A, Chowdhary A, Sardana K, Gautam RK, Sharma PK. Complete cure of *Fusarium solani* sp. complex onychomycosis with Qs NdYAG treatment. *Dermatol Ther* 2018;31:e12580.

32. Kordalewska M, Zhao Y, Lockhart SR, Chowdhary A, Berrio I, Perlin DS. Rapid and accurate molecular identification of the emerging multidrug-resistant pathogen *Candida auris. J Clin Microbiol* 2017;55:2445–52.

33. Kotarkonda LK, Kulshrestha R, Ravi K. Role of insulin like growth factor axis in the bleomycin induced lung injury in rats. *Exp Mol Pathol* 2017;102:86–96.

34. Kotwani A, Joshi PC, Jhamb U, Holloway K. Prescriber and dispenser perceptions about antibiotic use in acute uncomplicated childhood diarrhea and upper respiratory tract infection in New Delhi: Qualitative study. *Indian J Pharm* 2017:49:418–31.

35. Kumar B, Kumari A, Khanna M, Ronsard L, Meseko CA, Sanicas M. The emerging influenza virus threat: status and new prospects for its therapy and control. *Arch Virol* 2018;163:831–44.

36. Kumar M, Singh R, Meena A, Patidar BS, Prasad R, Chhabra SK, Bansal SK. An improved 2-dimenstional gel electrophoresis method for resolving human erythrocyte membrane proteins. *Proteomic Insights* 2017;8:1–7.

37. Kumar R. Menace of air pollution in 21st century. *Indian J Chest Dis Allied Sci* 2018;60:5–6.

38. Kumar R, Gupta N, Poongadan MN, Balasubramanin V. Clinical spectrum of 106 cigarette and bidi and non-smokers with lung cancer at a tertiary care center in India. *Indian J Chest Dis Allied Sci* 2017;59:69–74.

39. Kumar R, Kotwani A. Rising threat of antimicrobial resistance: judicious use of antibiotics is the way forward (Editorial). *Indian J Chest Dis Allied Sci* 2017;59:165–6.

40. Kumar R, Kumar D, Singh K, Mavi AK, Kumar M. Identification of airborne pollens in Delhi. *Indian J Allergy Asthma Immunol* 2018;32:28–33.

41. Kumar R, Kumar M, Bisht I, Singh K. Prevalence of aeroallergens in patients of bronchial asthma and/or allergic rhinitis in India based on skin prick test reactivity. *Indian J Allergy Asthma Immunol* 2017;31:45–55.

42. Kumar R, Saroj SK, Mishra J, Rachna, Dubey SM, Amrita, Berry A, Raheja A, Goyer G, Kadambri, Bhardwaj M, Malik M, Kumar N, Tyagi P, Solanki P, Verma R, Salaria R, Savitri, Kumar S and Zafar Z. National Tobacco Quit-line Services. *Indian J Chest Dis Allied Sci* 2016;58:221–3.

43. Mohsin J, Hagen F, Al-Balushi ZAM, de Hoog GS, Chowdhary A, Meis JF, Al-Hatmi AMS. 2017. The first cases of *Candida auris* candidaemia in Oman. *Mycoses* 2017;60:569–75.

44. Narang A, Giri A, Gupta S, Garima K, Bose M, Varma-Basil M. Contribution of putative efflux pump genes to isoniazid resistance in clinical isolates of *Mycobacterium tuberculosis. Int J Mycobacteriol* 2017;6:177–83.

45. Pandey A, Kulshrestha R, Menon B, Rajkumar, Gaur SN. Anthracotic pigment in transbronchial lung biopsy: an innocent bystander or pathogenic agent for parenchymal lung disease. *Indian J Chest Dis Allied Sci* 2018;60:27–31.

46. Pandey A, Kulshrestha R, Singh H, Bhardwaj S, Bansal SK. Role of transforming growth factor and vascular endothelial growth factor and their receptors in the pathogenesis of bleomycin induced lung fibrosis. *J Med Sci Clin Res* 2017;5:23684–91.

47. Pooja Bhati, Vishal Bansal, Jamal Ali Moiz. Comparison of different volumes of high intensity interval training on cardiac autonomic function in sedentary young women. *Int J Adolesc Med Health* 2017; 0(0): 1-13. doi:10.1515/ijamh-2017-0073

48. Prakash A, Randhawa HS, Khan ZU, Ahmad S, Hagen F, Meis JF, Chowdhary A. 2018. Environmental distribution of *Cryptococcus* species and some other yeast-like fungi in India. *Mycoses* 2018;61:305–13.

49. Ray A, Gulati K, Thokchom SK, Rai N. Immunopharmacology research including vaccines in India (2012-2017). *Proc Indian Natl Sci Acad* 2018;84:169–83.

50. Rhodes J, Desjardins CA, Sykes SM, Beale MA, Vanhove M, Sakthikumar S, Chen Y, Gujja S, Saif S, Chowdhary A, Lawson DJ, Ponzio V, Colombo AL, Meyer W, Engelthaler DM, Hagen F, Illnait-Zaragozi MT, Alanio A, Vreulink JM, Heitman J, Perfect JR, Litvintseva AP, Bicanic T, Harrison TS, Fisher MC, Cuomo CA. Tracing genetic exchange and biogeography of *Cryptococcus neoformans* var. *grubii* at the global population level. *Genetics* 2017;207:327–46.

51. Rohil Vishwajeet, Purkayastha K, Pavani P, Sharma A, Bhattacharjee J. Anticancer activity of polyphenolic acetates mediated by calreticulin transacetylase in lung cancer: an epigenetic modulation. *J Cancer Sci Therapy* 2017;9 (Suppl. 10):67.

52. Rohil Vishwajeet, Vijayan VK, Kumar Raj, Joshi Rini, Pavani P, Paul Shweta, Sharma Anju, Rahman M. A study on the correlation of matrix metalloproteinase MMP1 in COPD and smoking in the North Indian population. *Asian J Med Sci* 2017;8:5–14.

53. Seidel D, Durán Graeff LA, Vehreschild MJGT, Wisplinghoff H, Ziegler M, Vehreschild JJ, Liss B, Hamprecht A, Köhler P, Racil Z, Klimko N, Sheppard DC, Herbrecht R, Chowdhary A, Cornely OA, FungiScope

Group. FungiScope™ global emerging fungal infection registry. *Mycoses* 2017;60:508–16.

54. Sharma C, Chowdhary A. 2017. Molecular bases of antifungal resistance in filamentous fungi. *Int J Antimicrob Agents* 2017;50: 607–16.
55. Sharma C, Kumar R, Kumar N, Masih A, Gupta D, Chowdhary A. Investigation of multiple resistance mechanisms in voriconazole-resistant *Aspergillus flavus* clinical isolates from a chest hospital surveillance in Delhi, India. *Antimicrob Agents Chemother* 2018:62:e01928-17.
56. Sharma K, Rohil V, Singh R, Kumar M, Gupta U, Bhattacharjee J. Association of MMP-9 1562 C/T genetic polymorphism and first-trimester MMP-9 serum levels with pregnancy hypertension. *Biomedicine* 2017;37:359–64.
57. Sharma Karuna, Singh Ritu, Rohil Vishwajeet, Kumar Manisha, Gupta Usha, Rahman M, Bhattacharjee Jayashree. Role of metalloproteinases (PAPP-A and MMP-9) in first trimester prediction of pregnancy hypertension. *Int J Biomed Adv Res* 2017;8:212–16.
58. Singh L, Kulshrestha R, Singh N, Jaggi AS. Mechanisms involved in adenosine pharmacological preconditioning-induced cardioprotection. *Korean J Physiol Pharmacol* 2018;22:225–34.
59. Singh P, Sinha R, Tyagi G, Sharma NK, Saini NK, Chandolia A, Prasad AK, Varma-Basil M, Bose M. PDIM and SL1 accumulation in Mycobacterium tuberculosis is associated with mce4A expression. *Gene* 2018;642:178–87.
60. Srivastava S, Bimal D, Bohra K, Singh B, Ponnan P, Jain R, Varma-Basil M, Maity J, Thirumal M, Prasad AK. Synthesis and antimycobacterial activity of 1-(β-d-Ribofuranosyl)-4-coumarinyloxymethyl- / -coumarinyl-1,2,3-triazole. *Eur J Med Chem* 2018;150:268–81.
61. Thakur T, Gulati K, Rai N, Ray A. Experimental studies on possible regulatory role of nitric oxide on the differential effects of chronic predictable and unpredictable stress on adaptive immune responses. *Int Immunopharmacol* 2017;50:236–42.
62. Thokchom S, Gulati K, Thakur T, Rai N, Ray A. Dendritic cells and immunomodulation: role in health and disease. *Curr Immunol Rev* 2017;13:132–43.
63. Tyagi G, Singh P, Varma-Basil M, Bose M. Role of vitamins B, C, and D in the fight against tuberculosis. *Int J Mycobacteriol* 2017;6:328–32.
64. Varma-Basil M, Nair D. Molecular epidemiology of tuberculosis: opportunities and challenges in disease control. *Indian J Med Res* 2017;146:11–14.
65. Walia K, Chowdhary A, Ohri VC, Chakrabarti A. Multidrug-resistant *Candida auris:* need for alert among microbiologists. *Indian J Med Microbiol* 2017;35:436.

Books

Chapters in Books

1. Gulati K, Rai N, Ray A. Effects of stress on reproductive and developmental biology: an overview. In: Gupta RC, editor *Reproductive and Developmental Toxicology;* Oxford: Elsevier; 2017:pp1063–75.
2. Khanna M, Agrawal N, Dhawan G, Chandra R. Influenza pandemics and the associated bacterial infections. Austin Pulishing Group. *Basic and Clinical Virology* 2017:pp1-6.
3. Khanna M, Nandi T, Roy S, Manocha N, Kumar P. Clinical insights of influenza vaccine: efficacy and protectiveness. Austin Pulishing Group. *Basic and Clinical Virology* 2018:pp1-7
4. Kumar R, Goel N. Inhalation devies and its uses. In: Training Manual for Good Inhalation Therapy Practices. Delhi: NCRRAI, V.P. Chest Institute;2017.
5. Kumar R, Tiwari M.Types of nebulizers and its uses. In: Training Manual for Good Inhalation Therapy Practices. Delhi: NCRRAI, V.P. Chest Institute. 2017
6. Rajput R, Khanna M, Sharma J. Abortive pandemics of influenza viruses. Austin Pulishing Group. *Basic and Clinical Virology* 2017:pp1-3.

Institute organised 1st Indian Summit on Allergy Diagnosis and Allergen Immunotherapy on December 8-9, 2017 at Paintal Memorial Golden Jubilee Auditorium. Specialists on allergy and immunotherapy from all over the world participated and shared their experience in the field. An MOU was signed between Vallabhbhai Patel Chest Institute (VPCI), University of Delhi, Delhi and Department of Allergology, University Hospital, Munster, Germany (UKM) on Teaching and Training; Exchange of Information and Academic Materials and Exchange of Faculty, Research Scholars and Administrative and Other Staff

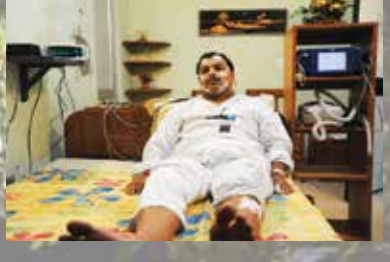
A symposium on Recent Advances in Nitric Oxide Research and Its Impact on Therapy was held on September 6, 2017. Dignitaries were lighting the lamp on the occasion and Dr Kavita Gulati, Department of Pharmacology addressing the audience on this occasion

Teacher's Day was celebrated in the Institute on September 5, 2017












Vallabhbhai Patel Chest Institute
University of Delhi, Delhi-110007, India
Phone: 91-011-27667102, 27667441, 27667667, 27666182
Website: www.vpci.org.in