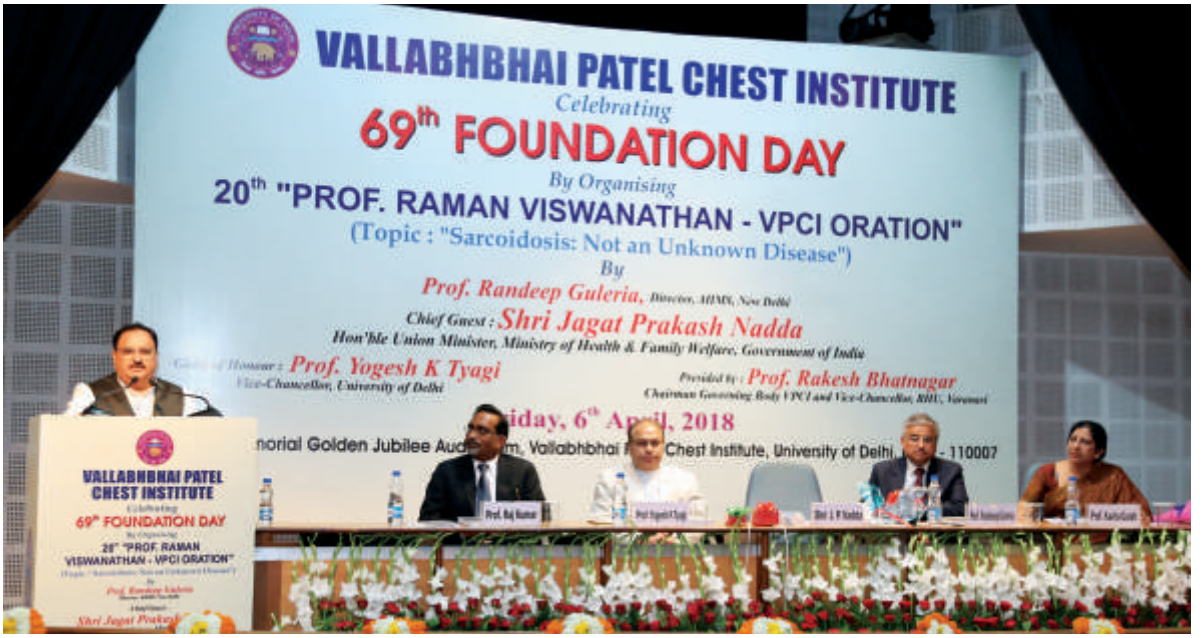
Vallabhbhai Patel Chest Institute

ANNUAL REPORT 2018-19

Vallabhbhai Patel Chest Institute

University of Delhi, Delhi, India

Annual Report 2018-19



On the occasion of 69th Foundation Day of the Institute (April 6, 2018), Shri J.P. Nadda, Hon'ble Union Minister of Health & Family Welfare, the Chief Guest, addressed the audience and inaugurated the "Daily Digital Pollen Count Information for Public" installed at Gate Nos 1 & 4 of the Intitute. *Other dignatories on the dias [from left]*: Prof. Raj Kumar, Director,VPCI; Prof. Yogesh Kumar Tyagi, Vice-Chancellor, University of Delhi; Prof Randeep Guleria, Director, All India Institute of Medical Sciences, New Delhi; and Dr Kavita Gulati, Department of Pharmacology, VPCI

Regional Workshop for Capacity Building in Tobacco Cessation, SEAR WHO-FTCH held in New Delhi from April 23-24, 2018. Prof. Raj Kumar [*second from left*] was invited as panelist for a panel discussion on "How effective are quitline services in SEAR to promote tobacco cessation", and gave a brief introduction about National Tobacco Quitline Services [NTQLS] at VPCI and its functioning in India.

ANNUAL REPORT
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Vallabhbhai Patel Chest Institute
University of Delhi, Delhi, India

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From the Director's Desk

It is my privilege to present the Institute's Annual Report for the year 2018-19. 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. The Institute with the support of the University of Delhi and Ministry of Health and Family Welfare, Government of India, has been able to strive and thrive to achieve its objectives to the cause of the society during the year under report.

Institute's objectives are to conduct research in basic and clinical aspects related to chest diseases, to train post-graduates in Pulmonary and Critical Care Medicine (DM and MD in Pulmonary Medicine) and allied disciplines (MD Microbiology, Biochemistry, Physiology and Pharmacology), to develop new diagnostic technology and disseminate scientific knowledge related to Chest Medicine to other institutions of 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.

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. The research laboratories of the Institute are being equipped with the latest technology to keep pace with the rest of the world.

The research contributions from the Institute are widely acclaimed, as 34 research projects funded by various Government Departments, like DHR, ICMR, DST, DBT, CSIR and Ayush amounting to funds over 15 crores in the Institute at present. The vibrancy of these research projects/activities can be well judged from the list of publications in peer/reviewed journals. The faculty members and students of the Institute delivered orations, guest lectures and presented papers in the International and National conferences. The faculty members and students of the Institute 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.

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 including pulmonary function studies, skin testing, bronchoscopy, sleep studies, pulmonary rehabilitation and various biochemical, pathological and microbiological investigations. 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. Comprehensive cardio-pulmonary rehabilitation programme comprising of both educational and training sessions is continuing at Cardio-pulmonary Rehabilitation Clinic at VCH.

National Tobacco Quit Line Services (NTQLS), 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.

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 continues to publish its biannual *Newsletter*.

Thrust areas identified for special attention in near-future include lung cancer, thoracoscopy and interventional bronchology, paediatric pulmonology, stem cell research. 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 (2018-19)

CONTENTS

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 received from Smt. Sheila Dikshit, the Hon'ble Chief Minister, Government of NCR, 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 Services, 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.
September 28,	2018	Prof. Raj Kumar joined as Director of the Institute.

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, 2018	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.
20th Oration	April 6, 2017	Prof. Randeep Guleria, Director, All India Institute of Medical Sciences, New Delhi.

20th Prof. R. Viswanathan–VPCI Oration was delivered by Prof. Randeep Guleria, Director, All India Institute of Medical Sciences, New Delhi. Shri J.P. Nadda, Honurable Minister of Health and Family Welfare, Government of India and Chief Guest of the function presenting a memento to the Orator, Prof. Randeep Guleria.

14th Prof. A.S. Paintal Memorial Oration, held on September 24, 2018, was delivered by Dr A.K. Jain, Professor of Excellence, Department of Physiology, Maulana Azad Medical College, New Delhi. Dr Achal Gulati, Director-Principal, Dr Baba Sahaeb Ambedkar Medical College and Hospital, Delhi was the Chief Guest.

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.
14th Oration	September 24, 2018	Dr A.K. Jain, Professor of Excellence, Department of Physiology, Maulana Azad Medical College, New 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.
5th Oration	January 12, 2019	Prof. Yogendra Singh, Department of Zoology, University of Delhi, Delhi.

5th Prof. H.S. Randhawa Oration, held on January 12, 2019, was delivered by Prof. Yogendra Singh [Right panel], Department of Zoology, University of Delhi, 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.
4th Oration	October 24, 2018	Dr J.C. Suri, former Consultant, Professor and Head, Department of Pulmonary, Critical Care and Sleep Medicine, VMMC and Safdarjung Hospital, New Delhi.

4th Dr V.K. Vijayan Oration, held on October 24, 2018; Dr J.C. Suri [Right panel], former Consultant, Professor and Head, Department of Pulmonary, Critical Care and Sleep Medicine, VMMC and Safdarjung Hospital, New Delhi delivered the oration. Prof. Surender Kashyap [Left panel], Director, Kalpana Chawala Medical College, Karnal, 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, 2019. Prof. Raj Kumar, Director of the Institute presenting a memento to the Chief Guest Dr N. Saravana Kumar, Joint Secretary, Department of Higher Education, Ministry of Human Resource Development, Government of India. On this occasion, 5th Prof. H.S. Randhawa Oration was delivered by Prof. Yogendra Singh, Department of Zoology, University of Delhi, Delhi. Prof. D. Behera, PGIMER, Chandigarh was the Guest of Honour for the event. Some of the former employees were honoured for their services on this day by Dr N. Sarvana Kumar

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 New Delhi - 110067
MEMBERS Treasurer, University of Delhi (Ex-Officio)	**Shri T.S. Kripanidhi**
Two members nominated by the Executive Council, University of Delhi	**Prof. Mahesh Verma** *(25.04.2018 onwards)* **Prof. M.K. Pandit** *(till 07.08.2018)*
Dean, Faculty of Medical Sciences, University of Delhi	**Prof. Rachna Gupta** *(till 25.07.2018)* **Prof. Vandana Roy** *(26.07.2018 onwards)*
Three members nominated by the Ministry of Health and Family Welfare, Government of India, New Delhi	**Dr R.K. Vats** Special Secretary and Financial Advisor
	Mrs Gayatri Mishra Joint Secretary
	Dr S. Venkatesh Director-General of Health Services
One member, not connected with the University, nominated by the Executive Council, University of Delhi	**Prof. Randeep Guleria** (*04.05.2018 onwards)* Director, All India Institute of Medical Sciences, New Delhi – 110 029
One Professor of the Institute by rotation according to seniority for a period of one year	**Dr Madhu Khanna** *(till 02.11.2018)* **Dr Balakrishnan Menon** *(03.11.2018 onwards)*
One Reader or Lecturer of the Institute by rotation according to seniority for a period of one year	**Dr Ritu Kulshreshta** *(till 02.11.2018)* **Dr Nitin Goel** *(03.11.2018 onwards)*
Representative of Non-teaching Staff of the Institute by rotation (as Special Invitee) according to seniority for a period of one year	**Shri Pradeep Kumar Gupta** *(till 28.02.2019)* **Shri Dhirendra Pal** *(01.03.2019 onwards)*
MEMBER-SECRETARY	
Director Vallabhbhai Patel Chest Institute, University of Delhi, Delhi (Ex-Officio)	**Prof. Raj Kumar**

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)
[Died on 28.01.2019]

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

Dr V.P. Gupta — *Member*
Principal
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

Prof. M.K. Pandit — *Member*
Dean, Faculty of Science
University of Delhi, Delhi-110007

Prof. Vandana Roy — *Member*
Dean, Faculty of Medical Sciences
University of Delhi, Delhi-110007

Prof. Malini Shariff — *Member*
Department of Microbiology — *(One year term according to*
Vallabhbhai Patel Chest Institute — *seniority 01.08.2018 onwards)*
University of Delhi, Delhi-110007

Prof. Balakrishnan Menon — *Member*
Department of Pulmonary Medicine — *(One year term according to*
Vallabhbhai Patel Chest Institute — *seniority 01.08.2018 onwards)*
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)
[Died on 28.01.2019]

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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

Shri S. Rangabhasim — Member
Deputy Registrar (Examination)
University of Delhi
Delhi-110 007

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

Institutional Animal Ethics Committee

Chairman (Biological Scientist)	**Dr Malini Shariff** Head, Department of Microbiology V.P. Chest Institute University of Delhi, Delhi-110 007
Member (Scientist from Different Discipline of the Institute)	**Dr Mandira Varma-Basil** *(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 Kavita Gulati** *(28.03.2018 onwards)* Department of Pharmacology
Main Nominee of CPCSEA	**Dr Harmeet Singh Rehan** *(28.03.2018 onwards)* Head, Department of Pharmacology Lady Hardinge Medical College New Delhi-110 001
Link Nominee of CPCSEA	**Dr Bal Gangadhar Roy** *(28.03.2018 onwards)* EFA, Institute of Nuclear Medicine and Allied Sciences Delhi-110 054
Nominee of CPCSEA (Scientist from Outside the Institute)	**Dr H.B. Singh** *(28.03.2018 onwards)* Ministry of Science and Technology New Delhi-110 001
Nominee of CPCSEA (Non Scientific Socially Aware Member)	**Shri Mahendra Yadav** *(28.03.2018 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
Raj Kumar, MD, MNASc, FAMS, FIAMS, FNCCP (I), FCAI

Biochemistry (including Clinical Biochemistry)

S.K. Bansal, MSc, PhD
Professor

Vishwajeet Rohil, MD
Assistant Professor

Microbiology (including Medical Mycology and Respiratory Virology)

(Mrs) Malini Shariff, MD, PhD
Associate Professor

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

(Mrs) Anuradha Chowdhary, MD
Associate Professor

(Mrs) Madhu Khanna, MSc, PhD
Associate Professor

Pathology

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

Pharmacology

(Mrs) Anita Kotwani, MSc, PhD
Associate Professor

(Mrs) Kavita Gulati, MSc, PhD
Associate Professor

Physiology

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

Pulmonary Medicine

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

Balakrishnan Menon, MD, DMRD
*Associate Professo*r

Nitin Goel, MD
Assistant Professor

Sonam Spalgais, DNB
Assistant Professor

Parul Mrigpuri, DNB
Assistant Professor

Viswanathan Chest Hospital

Officer-in-Charge

Raj Kumar
Professor

Library

Dr Uma Tyagi, MPhil (Physics), MLib Sci, PhD
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

Inauguration of Patient Registration Hall at Viswanathan Chest Hospital of the Institute on June 18, 2018 by Prof. Rakesh Bhatnagar, Chairman, GB, VPCI and Vice-Chancellor, Banaras Hindu University, Varanasi [Uttar Pradesh]

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

Number of new patients attending OPD	13819
Number of follow up patients visiting OPD	51861
Total Outdoor Patients	65680

Number of indoor patients

General Wards	2226
Emergency Wards	5365
Total Indoor Patients	7591
Emergency treatment provided	29588
Total number of patients treated in ICU	343

Number of routine and specialised investigations done at VCH during the year

Arterial blood gases	20097
Bronchoscopy	393
Bronchoalveolar lavage	299
Pulmonary function tests	23469
CT scans	1957
Ultrasounds	0
X-rays	23940
Electrocardiogram	3975
Polysomnograms	299
HIV testing	1323
Clinical biochemistry	54702
Skin tests	1528
Serum IgE test performed	3229
ANA	1009

c-ANCA	438
p-ANCA	436
SCL-70	741
HBsAg	1540
HCV	1539
Serum ACE	975
Vitamin D	84
Thyroid Profile	705

Biochemistry

Blood glucose	3557
Liver function tests	25295
Kidney function tests	22440
Pleural fluid biochemistry	270
HbA1c	2173
Lipid profile	1027
Total	**54762**

Microbiology

1. *Bacteriology Laboratory*

Clinical specimens processed for isolation and identification of aerobic pathogens

Nature of Specimen

Sputum	2889
Urine	587
Bronchial aspirate/ lavage	355
Pleural fluid	60
Blood	423
Endotracheal aspirate	153
Pus/(FNAC/Tips)	32
Total	**4499**

2. *Serology Laboratory*

Rheumatoid factor	910
C-reactive protein	386
Widal	6
Total	**1302**

3. Anaerobic Culture 172

4. Mycobacteriology Laboratory

Nature of Specimen

	LJ medium	MGIT	GeneXpert
Sputum	7376	212	1676
Bronchial aspirate	207	31	372
Pleural fluid	112	12	182
ET aspirate	54	4	21
CSF	6	3	2
Pus/Biopsy	27	6	20
FNAC	23	5	24
Total	**7805**	**273**	**2297**

Drug susceptibility test (DST) for *M. tuberculosis:* 110

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

Line probe assay for firstline drugs: 25

Line probe assay for *Mycobacterium* sp: 100

5. Mycology (VPCI and other hospitals)

Nature of Specimen	
Sputa	3380
Blood specimens	1203
Bronchial lavage/aspirate/washings/endotracheal aspirate/pleural fluid	719
Blood culture	162
Tissue biopsies/ nasal polyps/skin scrapings/nail scrapings	39
CSF	45
Urine and Miscellaneous (swabs/nasal polyp/ FNAC/discharge/pus)	446
Total	**5994**

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

Pathology

1. Hematology Laboratory

Hemogram	17,061
Platelet count	15,726
Absolute eosinophil count	4,163
Peripheral smear	59
P/S for malarial parasite	28
ESR	217
BT, CT, PT, APTT	697
Total	**37,254**

2. *Clinical Pathology Laboratory*

Total of 796 urine analysis were done during the period, including specific gravity, pH, albumin, sugar, microscopic examination and ketone bodies.

3. *Histopathology Laboratory*

Lung biopsy- TBLB and EBLB	521
Skin biopsy	03
Experimental lung biopsy	576
Total	**1100**

4. *Cytopathology Laboratory:*

Sputum	304
BAL fluid	78
FNAB: Percutaneous	68
Transbronchial (TBNA)	01
Bronchial aspirate	22
Pleural fluid	103
Tracheal aspirate	07
Pus cytology	04
Total	**586**

5. Immunohistochemistry panel performed for lung cancer and lung fibrosis during the period

Biopsies Processed	**Number**	**Immunohistochemistry**	**Number**
Lung biopsy-TBLB, EBLB	78	bFGF	17
Skin biopsy	01	NSE	7
Experimental biopsy	22	Caveolin-1	2
Pleural biopsy	02	CD-68	6
Immunohistochemistry	**No of Cases**	Vimentin	10
Napsin	30	Caspase	10
KRAS	30	TIMP-3	9
PD-L1	5	MMP-8	1
Pan CK	21	SP-C	5
TTF-1	29	HOX	1
Calretinin	9	Elastin	7
WT-1	8	NSE	7
CK-20	4	CD45	4
CK-7	7	EGFR-	20
CEA	21	EGFR-L	10
Synaptophysin	9	CD-1a	5
CK5/6	6	S-100	3
ALK	1	Chromogranin	11
P40	14	B-Actin	2
CD8	2	P63	5

6. Cell Culture Laboratory

Research work on the A549 human alveolar epithelial cell line is presently being performed. The TGF-β and vimentin expression are being studied by immunocytochemistry and real-time PCR.

A Workshop on Quality Laboratory Services was organized by National Centre for Respiratory Allergy, Asthma and Immunology, VPCI on April 12, 2018.

Tobacco Cessation Clinic

The tobacco related deaths and suffering from the 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 (TCC) was established at Vallabhbhai Patel Chest Institute, 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, TCC was upgraded in the year 2009 as Resource Centre for Tobacco Control. TCC is providing services since then through counselling, nicotine replacement therapy (NRT), non-NRT (including registration, CoHb monitoring, Quit date plan, follow-up and telephonic follow-up and pulmonary function test in out-patient department of the hospital wing from Monday to Friday (9:00 AM to 5:00 PM) to the smokers and tobacco chewers who are willing to quit smoking and tobacco chewing. TCC 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 its inception, TCC conducted 55 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, 2019, 8272 new tobacco users and 3436 follow-up tobacco users availed the services

Total no. of new tobacco users registered for TCC from 1st April, 2018 to 31st March, 2019	436
Tobacco users turn up for follow-up	228
Routine follow-up of registered tobacco users on telephone in this duration	1700+
No of tobacco users to whom medication prescribed	36 (8.3%)
No. of tobacco users quitted with medication	5 (13.9%)
No. of tobacco users contacted	205 (47.0%)

During the period from 1st April, 2018 to 31st March, 2019, 112 subjects (tobacco users) quit their tobacco habit for at least 2 weeks. Follow-up calls were made to 436 registered tobacco users in this duration to access their present quitting status, out of these 214 (49.1%) were contacted and rest 222 (50.9%) could not be contacted due to various reasons(STD number, switch off, person not available, expire, call not answering, out of station, caller busy, number does not exist, phone dead, etc.). A total of 107 tobacco users have quit their tobacco habit with the sessions of "Behavioural Counselling" alone and 5 with "Pharmacotherapy".

The continuous abstinence rate among 214 tobacco users at 2 weeks, 1 month, 3 months, 6 months, 9 months, and 12 months is given below in the table.

Table. Abstinence rate of tobacco users

Abstinence Rate	Tobacco Users (%)
2-week (n=214)	112 (52.3)
1-month (n=214)	92 (43)
3-month (n=211)	64 (30.3)
6-month (n=188)	36 (19.2)
9-month (n=123)	16 (13.0)
12-month (n=58)	7 (12.1)

Yoga Therapy and Research Centre

The Yoga Therapy and Research Centre conducted yoga classes to teach different Yoga therapy to heal the diseases of patients come to attend these therapy 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 sessions are specially designed for the management and eradication of different health disorders, like bronchial asthma, hypertension, stress, obesity etc. The patient first reports to yoga OPD at VPCI during the period 9 AM to 3 PM, Monday to Friday to the 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 the 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 Prof. Raj Kumar, Director and Mr. Manoj Kumar, Yoga Therapist conducted the 4th International Day of Yoga programme on 21 June, 2018 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 programme 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 during the year**
  - **Breathing retraining & education** **380**
  - **Completed Supervised Rehabilitation program** **51**
    (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.

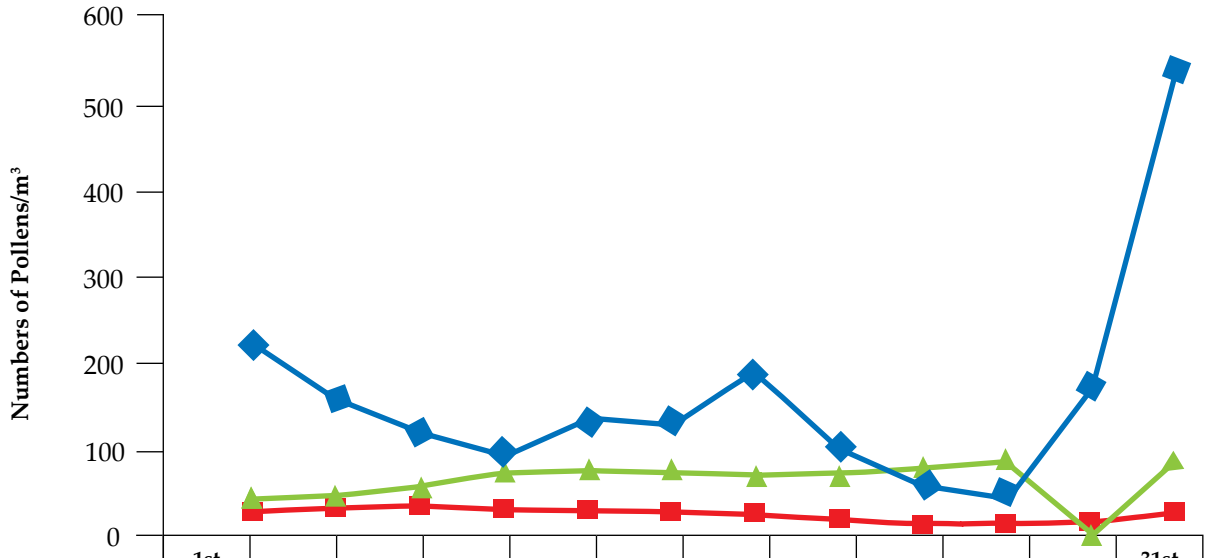
National Centre of Respiratory Allergy, Asthma and Immunology

The National Centre of Respiratory Allergy, Asthma and Immunology (NCRAAI) was inaugurated and dedicated in service on February12, 2011 by Prof. P.N. Tandon, Chairman, Governing Body of the Institute and the President, National Brain Research Centre Society, Gurugram, under the supervision of Dr Raj Kumar, Professor and Head, Department of Respiratory Allergy, Asthma and Applied Immunology, VPCI, Delhi. The aim of the Centre is 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.

A digital pollen count monitor for public, inaugurated by Union Minister of Health, Shri J.P. Nadda on the occasion of 69th Foundation Day of the Institute, has been set up at the Institute at Delhi University. Now pollen count would be displayed at the hospital gate Nos. 1 & 4 so that people who are predisposed to allergy caused by pollens can take preventive measures. The digital display board at the institute will enable people with chronic allergies to be better prepared for a dusty or pollen day on the road. It will also help create awareness about pollen concentration in the air, which is one of the major reasons for repeated attacks in asthma patients.

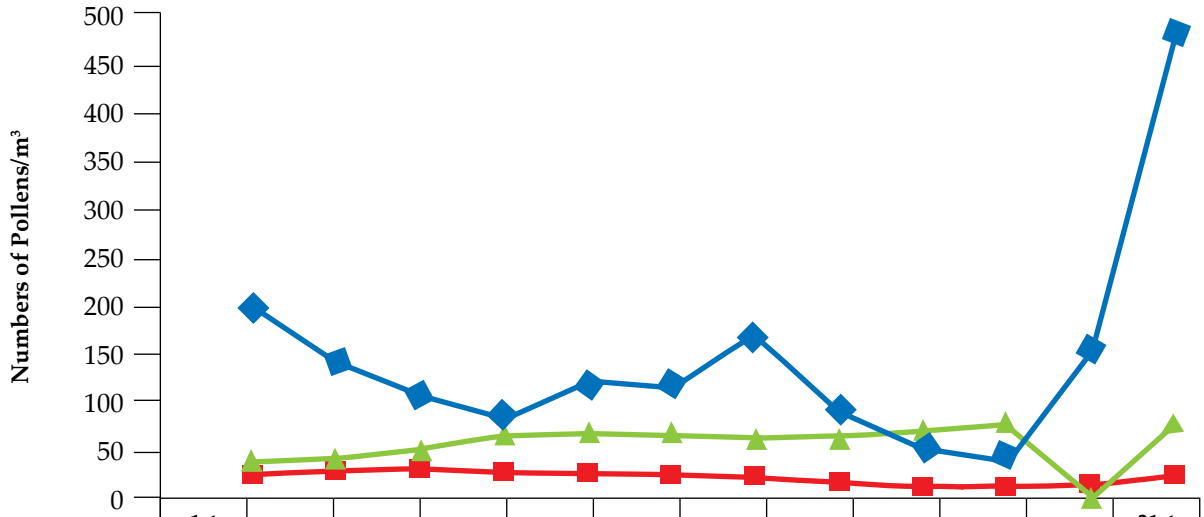
On the occasion of 69th Foundation Day of the Institute, Shri J.P. Nadda, Hon'ble Union Minister of Health & Family Welfare, Government of India, was the Chief Guest, who inaugurated the "Daily Digital Pollen Count Information for Public" installed at Gate Nos. 1 & 4 of the Institute.

1-Day Pollen's count/m³ last one year 1st April 2018-31st March 2019 data graph in Delhi region



	1st April 2018	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	31st March 2019
Pollen Count/m³ 1day	223.62	159.61	121.23	95.9	133.35	128.54	184.96	101.38	56.06	47.45	169.42	539.09
Temperature (⁰C)	27.27	31.47	33.11	29.93	29.23	26.07	23.76	19.03	13.4	13.23	15.66	25.99
Humidity (%)	43.53	48.06	57.11	75.4	77.79	76.67	69.24	71.01	79.22	82	0.847	89.41

7-Day's Pollen's count/m³ last one year 1st April 2018-31st March 2019 data graph in Delhi region



	1st April 2018	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	31st March 2019
Pollen Count/m³ 7-day	229.83	149.54	118.63	94.19	121.12	110.87	177.7	99	55.741	48.41	150	454.83
Temperature (⁰C)	27.27	31.47	33.11	29.93	29.23	26.07	23.76	19.03	13.4	13.23	15.66	25.99
Humidity (%)	43.53	48.06	57.11	75.4	77.79	76.67	69.24	71.01	79.22	82	0.847	89.41

Table. Month-wise mean pollen's count, temperature and humidity during 1st April 2018-31st March 2019

Month 2018-19	Pollen Count/m^3 1-day	Pollen Count/m^3 7-day	Temperature (°C)	Humidity (%)
1st April 2018	223.62	229.83	27.27	43.53
May 2018	159.61	149.54	31.47	48.06
June 2018	121.23	118.63	33.11	57.11
July 2018	95.9	94.19	29.93	75.4
August 2018	133.35	121.12	29.23	77.79
Sept 2108	128.54	110.87	26.07	76.67
Oct 2018	184.96	177.7	23.76	69.24
Nov 2018	101.38	99.0	19.03	71.01
Dec 2019	56.06	55.74	13.4	79.22
Jan 2019	47.45	48.41	13.23	82
Feb 2019	169.42	150.0	15.66	0.847
31st March 2019	539.09	454.83	25.99	89.41

Programme Organised

1. 43rd Workshop on Respiratory Allergy: Diagnosis and Management (June 18-22, 2018)

43rd Workshop on Respiratory Allergy: Diagnosis and Management was organised by the Institute in collaboration with CSIR-Institute of Genomics and Integrative Biology, Delhi from June 18-22, 2018. Professor Raj Kumar, Chairman, Organizing Committee along with Professor Rakesh Bhatnagar, Vice Chancellor of Banaras Hindu University and Dr A.B. Singh, Emeritus Scientist (Ex), CSIR-Institute of Genomics and Integrative Biology, Delhi University inaugurated the workshop by launching the Training Manual.

Hands on practical demonstration of Skin Prick Test (SPT) to participating deligates

Demontration of Pollen Count Station and Faculty with Delegates during the Workshop

2. 1st Update on Allergen Immunotherapy (March 5-6, 2019)

The Institute organized a 2-day 1st Update on Allergen Immunotherapy in collaboration with University Klinikum Munster (UKM) supported by the Society for Tobacco Control from March 5-6, 2019. Professors and Doctors from National and International Reputes were guest faculties of this programme.

National Tobacco Quitline Services

"NATIONAL TOBACCO QUITLINE SERVICES" runs under the aegis of Vallabhbhai Patel Chest Institute, University of Delhi, are a 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, of the Institute. It is operational six days a week, (Tuesday to Sunday 8AM to 8PM) following WHO protocol of Quitline 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

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 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 Library of the Institute 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 10100 Books, 25025 bound Journals, 175 CD's, 570 Thesis and 27 National and International Reports. A total 16 Journals (06 International and 10 National) are being received on exchange programme with the Institute's Journal and 03 Journals (02 International and 01 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 renders its services not only to the scientists/research scholars of the Institute, but also to other Colleges and Institutes of the University of Delhi. Institute is a member of National Level ERMED Consortium (e-journals) for the Calendar Since year 2018. ERMED Consortium subscribed 239+ e-journals from five publishers. All e-journals are configured on Static IP / IP's of our Institute. Library initiates appropriate efforts from time to time to create awareness among staff, research scholars, students, etc. to enhance maximum utilisation of e-journals through customised e-journals gateway http://www.ermed.in and benefit of access/download of articles from the 'Cochrane Library'. This is an initiative by 'National Medical Library' which is a collection of six databases that contain different types of high-quality, independent evidence to inform health-care decision-making, and a seventh database that provides information about Cochrane groups through single gateway http://www.cochranelibrary.com. 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 DUCC network /LAN and a separate Leased line connectivity (VPCI) with 10 Mbps from MTNL. Library also provides inter-library loan facilities and reprographic services on demand.

The Library follows an open Access system. Library is equipped with modern information technology equipment's and continues to provide Internet/ e-mail services to the users to access CAS (Current Awareness Services) and SDI (Selective Dissemination of Information) services. These are provided to the users in the form of online/offline through e-mail and/or in print during the year. Library uses "LibSys 4.0" Library Management Software, 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 5:30 PM] and on Saturday [9:00 AM to 5:00 PM].

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

Studies on erythrocyte membrane protein profile of asthmatics and healthy controls by LC-MS/MS showed the presence of 97 proteins consisting of ≥2 unique peptides. Of these, 66 proteins were expressed in all the groups, while 31 proteins were differentially present or absent in various groups. Further, 7 proteins were absent in healthy subjects but were present only in asthmatic patients, and differentially distributed. Of these 7 proteins, 5 were of human origin and 2 were of origin of status (OS) of other organisms. Similarly, in active asthmatics, only one protein of human origin was present exclusively. It was absent in healthy and asthmatic patients in remission. In mild intermittent asthmatics, 2 proteins were absent exclusively. These were of human origin. In mild persistent asthmatics, 4 proteins were absent exclusively. Of these 2 were of human origin and the other 2 proteins were of OS of other organisms. In moderate persistent asthmatics, 5 proteins were absent exclusively. Of these 3 were of human origin and other of 2 proteins were of the OS of other organisms. In severe persistent asthmatics, interestingly, 3 proteins were exclusively present and 2 exclusively absent. Out of these 3 proteins exclusively present, 2 were of human origin, and the other 2 proteins, which were exclusively absent, were of human origin. The quantitative showed upregulation of 9 and downregulation 21 proteins assessment (≥ 1.5 fold change) in asthma.

Our analysis showed that several PTMs (phosphorylation and acetylation) in 9 proteins, which may be responsible for cellular activities including biological processes, metabolic functions, cell morphology, shape and size etc. These were distinctly present or absent in different phenotypes of asthma.

The protein-protein interaction analysis showed glyceraldehyde 3 phosphate dehydrogenase to be an important protein, which is known to play an important role in glycolysis and in maintaining the balance between oxidant and antioxidant status in asthma

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 on genetic polymorphism on CRHR1 gene in asthmatics and healthy controls showed the presence of 25 single nucleotide polymorphisms (SNPs) in it (including 3 novel SNPs reported for the first time from our laboratory). Among these 25 SNPs, 16 were found to be significantly associated with asthma

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

We have completed major part of the research work and have customized the micro-array platform based on our RTPCR results. The samples for micro-array analysis had been outsourced to a contract research organization for the study of up-/down-regulation of genes induced by CRTAase and ellagic acid and its derivatives in presence or absence of HDI. We have recently received the micro-array profiling results. We had sent the samples in duplicate for Agilent's micro-array analysis and repeated the micro-array profiling so as to validate the results. The data obtained is robust which will take at least six months for data compiling, further analysis, correlation and interpretation to reach a proper significant conclusion. The micro-array analysis, a progressive study on up-regulation and down-regulation of specific genes in all the study samples is under process.

4. The normal levels of tumour necrosis factor-alpha, ADAM33 and their correlation between patient (COPD) and control group along with various other parameters

Serum tumour necrosis factor-alpha (TNF-α) was found to be directly proportional to the COPD severity and indirectly proportional to the FEV_1/FVC ratio of the patients. With the help of Mann-Whitney test we get to know ADAM33 levels show significant difference between smoker COPD and non-smoker COPD ($P<0.05$) which shows that ADAM33 as a metalloproteinase plays a crucial role in lung remodelling.

5. Validation of single nucleotide polymorphisms (SNPs) in the gene ADAM33 linked to COPD susceptibility by using restriction fragment length polymorphism

SNP S1 and ST+5 shows significant difference in patient groups compared to controls.

6. Interaction between protein ADAM33 - known/unknown inhibitors via molecular docking

Interaction studies carried out using Schrodinger suite for 20 molecules concluded that curcumin derivative compounds are good natural inhibitors for matrix metalloproteinases (MMPs). These have low glide energy and very low docking score. The docking results of marimastat showed the Glide score (G score) as -12.9074 and Glide energy as -42.1798.

7. Association of matrix metalloproteinase-9 (MMP-9) genetic polymorphism (-1562C/T) and first trimester serum levels with pregnancy hypertension

MMP-9 (-1562 C/T) polymorphism has no association with lowering of MMP-9 during first trimester and development of pregnancy hypertension.

8. First-trimester inflammatory markers (TNF-alpha, IFN-gamma) for risk evaluation of pregnancy hypertension

Increased levels of pro-inflammatory cytokines suggest the role of underlying inflammation in pathogenesis of pregnancy hypertension.

9. Role of MMP-9 in first trimester prediction of pregnancy hypertension

Inadequate expression of MMP-9 may result in incomplete or poor trophoblast invasion and subsequent complication of pregnancy hypertension.

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 undertakes 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 V.P. Chest Institute, Delhi

Two hundred and sixteen patients were included in the study up to February 2019, 124 males and 94 females. 63 and 155 patients were <40 and >40 years of age, respectively. The clinical samples included were bronchial aspirates from patients showing exacerbation. Out of these 216 patients, 82 patients yielded anaerobes in their clinical samples. Thirty-nine patients had more than one type of anaerobic organisms. Hence, a total of 127 isolates were recovered belonging to as many as 11 genera. One hundred and forty-five aerobic organisms were isolated of which *Klebsiella pneumoniae* (3), *Escherichia coli* (5), *Pseudomonas* spp (5) and *Streptococcus pneumoniae* (12) have been implicated in the lower respiratory infections. MIC was determined by agar dilution method for all species of anaerobes except *Bacteroides* spp where in Microbroth dilution was used. MIC of seven antibiotics on 67 isolates was tested. The isolates belonged to genera *Bacteroides, Prevotella, Veilonella, Actinomyces* among others. Sensitivity to penicilin ranged from 27%-30% in gram negatives and 14% and 21% in *Parvimonas micra* and *Actinomyces* respectively. 83% to 100 of isolates were sensitive to cefoxitin. Similarly, most strains showed good sensitivity to tetracycline and chloramphenicol. 75% to 82% were sensitive to metronidazole but some genera *Prevotella* (38%), *Actinomyces* (53%) & *Parvimonas* (29%) showed lower susceptibility. Surprisingly, considerable resistance was seen for moxiflox and clindamycin.

2. Phenotypic and molecular characterization of clinical isolates of multi-drug resistant *Klebsiella pneumoniae*

Klebsiella pneumoniae (Kpn), a non-motile, Gram-negative rod from *Enterobacteriaceae* family, is associated with community-acquired and nosocomial infections. Multidrug resistant *Kpn* are increasing in the hospital setting. The study was undertaken to detect, identify and characterize clinical isolates of *Kpn* with reference to antibiotic susceptibility, presence of different types of β-lactamase and molecular typing by randomly amplified polymorphic DNA (RAPD).

Sixty non-repetitive multidrug-resistant strains of *Kpn* obtained from patients visiting VPCI, Delhi were characterized. Isolates exhibited (10-100%) resistance to various antibiotics. Among the 59 isolates that produced β-lactamases 32 (53.3%) ESBL, 52 (86.7%) MBL and 5 (8.3%) AmpC were observed. Coexistence of ESBLs and MBLs in 25 (41.7%) isolates and MBLs and AmpC in 3 (5%) were found. Interestingly, one isolated produced of all three. 55 (91.7%), 44 (73.3%), 16 (26.7%), 6 (10%) and 30 (50%) isolates were positive for genes encoding ESBLs, MBLs AmpC, KPC and Oxacillinases, respectively. Most prevalent ESBL were bla TEM-1, bla SHV-1, and bla CTX-M-1. bla SPM and bla NDM were most widespread among MBL while bla DHA and bla CIT were most frequent among AmpC. Presence of genes that encodes for various β-lactamases by *Kpn* isolates further correlated significantly with multi-drug resistance. High degree of genetic variability was observed among 55 typeable isolates using RAPD. Genetic analysis showed 18 distinct RAPD patterns and further analyzed as 13 clusters or genetic diversity subgroups. Isolates showed 100% similarity belonged to 7 different clusters, all clusters found to have TEM-1 and SHV-1.

3. 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 professionals working in these units, environment samples etc were collected. The reports were submitted along with the recommendations.

4. Ethambutol resistance: an interplay of efflux genes over-expression and genomic mutations

Besides genomic mutations, efflux mechanisms may contribute to intrinsic drug resistance in *Mycobacterium tuberculosis.* In the present study, expression analysis of efflux genes was studied in clinical isolates of *M. tuberculosis* and correlated with the presence of mutations responsible for ethambutol (EMB) resistance.

Well characterised 28 EMB resistant and 29 EMB susceptible clinical isolates of *M. tuberculosis* were subjected to MIC determination by Microplate Alamar Blue assay (MABA) assay. Real-time expression of efflux genes drrA, drrB, drrC, iniA, jefA, Rv1686c, Rv1687, Rv0194, Rv1458c, Rv0876c, Rv0842, Rv1877 was studied in clinical isolates of *M. tuberculosis* without canonical mutations but with low level resistance (LLR) to EMB (n=3), clinical isolates with mutations at embB306 or embB497 and with high level resistance (HLR) to EMB (n=4); EMB- susceptible clinical isolates (n=4) and H37Rv. The strains were exposed to sub-inhibitory concentration (1/4thMIC) of EMB. SigA and rrs were used as internal controls. Genomic mutations were determined by Sanger sequencing and whole genome sequencing (WGS). Efflux genes quantification showed that drrABC, jefA, Rv1686c, Rv1687 and Rv0842 were up-regulated only in EMB resistant isolates, while the efflux pump Rv0876c was up-regulated only in EMB susceptible isolates. Interestingly, All the HLR isolates exhibited expression of one or more efflux pump genes, whereas only 1/3 (33.33%) LLR isolate showed upregulation of efflux genes. WGS did not reveal any mutations in the efflux genes. Our study suggests that high level EMB resistance may occur as a result of combination of mutations in target genes and up-regulation of efflux genes.

Institute organised a CME on Mapping the Footprints of NTM Infection: The Neglected Mycobacterial Disease on November 1, 2018.

5. Search for novel antituberculosis drug targets: biotin biosynthesis pathway

Biotin is an essential micronutrient required by *Mycobacterium tuberculosis* as a co-factor for many essential enzymes. It has been shown that exogenous biotin present in the host serum is not sufficient for bacterial growth; hence, *M. tuberculosis* synthesizes biotin on its own. The present study was performed to understand the role of *Rv0089 and Rv2715* in biotin biosynthesis and their effect on the lipid profile and pathogenicity of *Mycobacterium tuberculosis.* pKO vector was used for the construction of knockout strains *Mtb*ΔRv0089 and *Mtb*ΔRv2715 using allelic replacement method. The knockout strains were grown on

Sauton's medium with or without biotin for growth kinetic, stress, colony morphology and electron microscopic studies. Lipid quantification and lipidomic profiles were studied using phosphovanillin assay and thin layer chromatography, respectively. RAW 264.7 cell line was infected with *Mtb*ΔRv0089, *Mtb*ΔRv2715 and H37RV. Immunoprecipitation was performed to quantify the biotinylated proteins in the recombinant strains. Deletion of Rv0089 gene rendered the bacterium with a stationary phase growth defect and altered colony morphology. *Mtb*ΔRv0089 had lower lipid content as compared to H37Rv. Addition of biotin improved the lipid composition and cell wall dynamics of MtbΔRv0089. The mutant was attenuated in macrophages and had a lower concentration of biotinylated proteins. In contrast, in the mutant, *Mtb*ΔRv2715, lipid content was comparable to *M. tuberculosis* H37Rv. Our results suggest an involvement of Rv0089 in biotin biosynthesis which could be explored in the future as a new drug target against *M. tuberculosis.*

6. Functional analysis of cell intrusion proteins of *Mycobacterium tuberculosis* as potential target for vaccine development

The establishment of an infection by *M. tuberculosis* depends on the initial interactions between *M. tuberculosis* and host cells interactions that are dictated by the surface characteristic of both. The present work aims is to make an attempt to explore the genes responsible for cell intrusion and to investigate differences in these genes between various clades and lineages of *M. tuberculosis* in an attempt to identify novel targets towards the development of an effective vaccine. Mammalian cell entry (mce) operon confers mycobacteria the ability to enter into mammalian cells and survive inside the macrophage. Similarly, the NlpC60 family has been associated with invasion of mycobacteria. The current project entails performing ex vivo experiments to study the role of these genes in cell invasion.

7. Evaluation of an array of PE-PPE genes for potential use in a diagnostic assay to identify *Mycobacterium tuberculosis*

Early diagnosis and treatment of TB remains a major problem hampering TB control worldwide. The shortcomings of currently available diagnostic methods prompted us to develop a rapid, inexpensive and easy to use diagnostic method. To achieve this, we searched for genes that were highly specific for the *Mycobacterium tuberculosis* Complex (MTBC), were conserved and were preferably on the cell wall. One such family of genes with these characteristics is the PE and PPE gene family. We bioinformatically screened all the PE-PPE family genes for certain parameters such as specificity for *M. tuberculosis* complex, localization on the cell and degree of variation among clinical isolates from various parts of world. Twelve genes were found to be best diagnostic candidates for the development of assay and were subjected for sequence variation analysis by whole genome sequencing and sanger sequencing in 49 clinical isolates of *M. tuberculosis* collected from the Department of Microbiology of the Institute. A panel of the clinical isolates will now be subjected to various stress conditions and their expression profile will be studied by Real-Time PCR. The genes which will show stable expression in stress conditions will be selected for the development of assay. For the development of assay, the selected gene will be cloned in *E. coli* DH5*α* strain and the protein will be purified for the antibody production. The purified antibody against *M. tuberculosis* specific PE-PPE gene will be used to develop an ELISA assay for the diagnosis of *M. tuberculosis.*

8. Emergence of clonal fluconazole-resistant *Candida parapsilosis* clinical isolates in a multicentre laboratory-based surveillance study in India

Candida parapsilosis infection is increasingly reported among hospitalized patients and, particularly in certain geographical areas, this yeast is the main pathogen causing candidaemia. Among the *C. parapsilosis* species complex, *C. parapsilosis* (sensu stricto) is the most common non-albicans *Candida* (NAC) species isolated from bloodstream infections (BSIs). Notably, 12%–17% of cases of candidaemia are caused by *C. parapsilosis,* which accounts for the second or third most common cause of candidaemia. Remarkably, 5.8% of the nosocomial *C. parapsilosis* isolates were resistant to fluconazole. Similar rates of fluconazole resistance, ranging from 0 to 7.5%, have been recorded in other surveillance studies. In the present study, we evaluated azole resistance in clinical isolates of *C.*

Institute in collaboration with European Society of Clinical Microbiology and Infectious Diseases orgnised ESCMID Postgraduate Education Course and Technical Workshop on Antifungal Resistance in *Candida* and *Aspergillus:* from Clinic to Clinical Laboratory from September 19-21, 2018. Faculty from international arena shared their experience in the field of microbiology with their counterparts in India.

parapsilosis (sensu stricto) collected from nine hospitals in India during a 3-year surveillance study of candidiasis, in which all yeast isolates were collected from 2015 to 2017. The azole target ERG11 gene was screened, and the significance of the novel A428G mutation that resulted in the non-synonymous amino acid substitution K143R in fluconazole-non-susceptible *C. parapsilosis* isolates was determined by direct transformation into *Saccharomyces cerevisiae* through gap-repair cloning. Additionally, we performed microsatellite analysis to determine the clonal lineage of fluconazole-non-susceptible *C. parapsilosis* strains circulating among different hospitals in India. A total of 64 (32%) *C. parapsilosis* isolates were non-susceptible to fluconazole, which included resistant (n=55; MIC >4 mg/L) and susceptible dose-dependent (n=9) isolates. Of these 64 non-susceptible isolates, a novel K143R amino acid substitution was noted in 92%, and the remaining five isolates had the Y132F substitution. Elevated azole MICs (16-fold) were detected in *S. cerevisiae* upon expression of *C. parapsilosis* ERG11 alleles carrying Y132F or K143R substitutions. Two major clusters of non-susceptible isolates were circulating in seven Indian hospitals. Considering that fluconazole remains the standard initial treatment for patients with invasive candidiasis owing to its low cost and safety profile, the emergence of fluconazole resistance in *C. parapsilosis* (sensu stricto) strains in India is concerning. The unusual finding of a dominant K143R substitution in ERG11p in fluconazole-resistant *C. parapsilosis* (sensu stricto) strains in several hospitals in India warrants further studies on its persistence and transmission behaviour in hospital settings.

9. Absence of azole or echinocandin resistance in *Candida glabrata* isolates in India despite background prevalence of strains with defects in the DNA mismatch repair pathway

Candida species are the most common cause of fungal infections worldwide among hospitalized patients. The distribution of *Candida* species isolated from patients with invasive candidiasis (IC) varies geographically

depending on environmental factors, the patient's age, and exposure to antimicrobial agents. *Candida glabrata* infections are increasing worldwide and exhibit greater rates of antifungal resistance than those with other species. Echinocandin resistance has been reported to be associated with cross-resistance to azole antifungals in 36% of the echinocandin-resistant strains, emphasizing the significance of multidrug-resistant (MDR) *C. glabrata.* DNA mismatch repair (MMR) gene deletions, such as msh2, in *C. glabrata* resulting in a mutator phenotype have recently been reported to facilitate rapid acquisition of antifungal resistance. We determined the antifungal susceptibility profiles of 210 *C. glabrata* isolates in 10 hospitals in India and investigated the impact of novel MSH2 polymorphisms on mutation potential. No echinocandin- or azole-resistant strains and no mutations in FKS hot spot regions were detected among the *C. glabrata* isolates, supporting our *in vitro* susceptibility testing results. CLSI antifungal susceptibility data showed that the MICs of anidulafungin (geometric mean [GM], 0.12μg/mL) and micafungin (GM, 0.01μg/mL) were lower and below the susceptibility breakpoint compared to that of caspofungin (CAS) (GM, 1.31μg/mL). Interestingly, 69% of the *C. glabrata* strains sequenced contained six nonsynonymous mutations in MSH2, *i.e.*, V239L and the novel mutations E459K, R847C, Q386K, T772S, and V239/D946E. Functional analysis of MSH2 mutations revealed that 49% of the tested strains (40/81) contained a partial loss-of-function MSH2 mutation. The novel MSH2 substitution Q386K produced higher frequencies of CAS-resistant colonies upon expression in the msh2 mutant. However, expression of two other novel MSH2 alleles, i.e., E459K or R847C, did not confer selection of resistant colonies, confirming that not all mutations in the MSH2 MMR pathway affect its function or generate a phenotype of resistance to antifungal drugs. The lack of drug resistance prevented any correlations from being drawn with respect to MSH2 genotype. Finally, mutator cells in the population may provide a selective advantage in vivo and enable this yeast with increased drug exposure to promote the development of antifungal resistance and/or pathogenicity. Despite the near absence of echinocandin or azole resistance in *C. glabrata* isolates in this patient population, the high prevalence of the mutator phenotype among strains, which have a heightened potential to develop resistance, is concerning. Our study calls out for continued vigilance, especially as antifungal exposure broadens at many centres.

10. Antifungal resistance in *Candida auris* blood stream infections

Candidaemia represents an ever-increasing threat to hospitalized patients requiring intensive care. The incidence of candidaemia has significantly increased globally, with advancements in medical/ surgical invasive procedures, use of broad spectrum antimicrobials, increasing acuity of clinical illness and extremes of ages of patient populations. In the past decade, there has been a global change in the epidemiology of invasive *Candida* infections, characterised by a progressive shift from *Candida albicans* to a predominance of non-albicans *Candida* spp (NAC). *C. auris* is being increasingly recognised as an emerging, multidrug resistant (MDR) species, causing invasive candidiasis. *C. auris* is becoming an important cause of nosocomial blood stream infections (BSIs) in Asia, Africa, America and Europe. The species is frequently misidentified as *C. haemulonii* or as several other *Candida* species by common commercial identification systems. Furthermore, it displays unique antifungal susceptibility profile, specifically resistance to fluconazole (FLU), a commonly used antifungal for *Candida* infections especially in low-resource countries. Notably, *C. auris* colonises the hospitalized patients and can easily be transmitted rendering tremendous implications from infection control standpoint. We determined the profile of candidemia at tertiary care hospital and report the emergence of *C. auris*. A total of 114 isolates of *Candida* species were analyzed. Of 114 *Candida* species, 39.4% (n=45) were identified as *C. tropicalis* followed by 17.5% (n=20) as *C. auris,* 14% (n=16) as *C. albicans* and 11.4% (n=13) as *C. parapsilosis*. The remaining isolates were *Diutina mesorugosa* (n=10; 8.7%), *C. glabrata* (n=6; 5.2%) and solitary isolates of *C. orthopsilosis, C. metapsilosis, C. lusitanae,* and *C. utilis.* Notably, *D. mesorugosa* isolates (n=10) were not identified by MALDI-TOF and were confirmed by sequencing. Further, 45% (n=9) *C. auris* strains exhibited low MICs of FLU (0.05-4μg/mL) and the remaining 55% (n=11) isolates had high MICs ≥64 μg/ml. Also, *D. mesorugosa* exhibited high MICs of FLU (32 μg/ml) in 2 isolates. A high rate of errors in antifungal susceptibility was noted with VITEK 2 as compared to the CLSI method. Finally, evidence suggests that *C. auris* has a propensity to spread rapidly within and between health care set-ups. In the current scenario of its high prevalence and high rate of resistance, strict infection control protocols are required to prevent the transmission of *C. auris* in the hospitals. The study also highlights that in the absence of accurate species identification the clinicians are misinformed and may fail to switch treatment to *C. auris*-specific treatments.

11. 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 do not 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 Autophagy pathway and its modulation by small molecules 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.

12. Role of microRNA in pathogenesis of influenza virus infection

In the present study, we have investigated the association of miR-155 and miR-141 with the pathogenesis of influenza virus infection. MicroRNA 155 is known to modulate the expression of various inflammatory and antiviral cytokines. The effect of microRNA 155 on viral replication, mediators of inflammation and antiviral response has been studied at RNA and protein level. Unfolded protein response (UPR) is another important mechanism involved in pathogenesis of different viruses such as dengue, Chikungunya, HIV and JEV. The activation of various UPR pathways during influenza infection and the association of these pathways with microRNA 155 and miR141 were evaluated. We observed that miR-155 overexpression inhibit influenza virus while miR-141 overexpression promote virus mediated translation shut down in host.

13. Aptamer mRNA chimera – the next generation vaccine

Aim of current study is to perform Aptamer (dendritic cells, receptor specific) mediated targeted delivery of influenza virus nucleoprotein (antigenic) mRNA to dendritic cells, which may prime the dendritic cells with viral antigen. The *in vivo* primed dendritic cells will activate immune T cell response against antigen, thus may provide protection against subsequent infection with influenza virus. We have compared the stability and translational ability of mRNA bearing modified nucleotides. It was observed that pseudouridine containing mRNA is more stable and have better translational ability than mRNA with native and other tested modification. Hence, pseudouridine will be used in further experiments. The aptamer chosen in the study is able to deliver the antigenic mRNA *in vitro* and *in vivo.* The immunogenic potential of chimera still needs to done. The information generated from the project is valuable in designing non-toxic cellular delivery platform which could have broad applications in vaccine and other field.

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

Chikungunya virus (ChikV) is an Alphavirus of the Togaviridae family transmitted to humans through arthropods bites (mosquitoes of the *Aedes* genus). 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 signalling cascades that is associated with pathogenesis of virus. One such pathway is UPR pathway that restore 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 and endoribonuclease), PERK kinase and the basic leucine zipper 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. 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. Chikungunya virus also induces autophagy during later stages of infection.

15. Study on the generation of peptide immunogen against dengue virus

This study will provide an approach for effective generation of safe multivalent vaccine candidate and as an alternative to the conventional reverse genetics approach used in vector-vaccine development. We anticipate the generation of peptide immunogen expressing immunogenic epitopes from all the serotypes of dengue virus which may further activate the immune system to elicit cross protection against the different serotypes. *Hitherto,* the peptide subunit immunogen has been validated in silico. Now, the peptide immunogen will be generated in HEK 293T cells using recombinant plasmids expressing the epitopes from different serotypes of dengue virus. Efficacy of the peptide will be assessed in vitro in murine dendritic cells and by T cell activation assay. Since the peptide immunogen will express the Tc cell epitopes, the chances of generation of non-neutralising antibody may be expected to be very low. The immunogenicity of peptide immunogen will be studied in the animal model. Six to eight weeks old female BALB/c mice will be used for this study. Mice will be divided into seven groups with seven mice per group. Each group of mice will be immunised intradermally with 15μg of peptide immunogen. One booster dose will be given after 3 weeks of first immunisation. The blood will be centrifuged to isolate the serum and immunogenicity of the peptide immunogen will be checked by micro-neutralisation and hemagglutination inhibition assay. Next, we will harvest spleen of the immunised mice, prepare splenocytes and check for the virus-specific CTLs by *in vitro* T cell proliferation assays.

Pathology

Research

1. Mutation analysis of lung cancer patients

Lung cancer is characterized by the multistep accumulation of multiple mutations, such as epidermal growth factor receptor (EGFR), anaplastic lymphoma kinase (ALK) fusion *KRAS* oncogene etc. These are promising therapeutic targets and improve the prognosis of advanced lung cancer patients. *KRAS* mutations are associated with resistance to EGFR tyrosine kinase inhibitors (TKIs); gefitinib, and erlotinib. Total 203 cases of lung cancer presented to VPCI have been assessed to date. These included 17 males and 31 females. Age ranged from 18 to 85 years. Of these 123 patients have been analyzed for the presence of EGFR mutations and 45 patients were assessed for KRAS using allele specific real-time PCR assay. For EGFR mutations, DNA was isolated from the following samples (n=193): BA-3, ET-1, Blood-83, Sputum-51, FNAC-21, TBLB-29, Pleural fluid-5. Positive EGFR mutations were identified in 69/193 (35.75%) samples, more frequent in male patients and smokers; 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 (34/69, 49.28%), L858R (13/69, 18.84%), deletions in exon 19 (11/69, 15.94%) and T790M (22/69, 31.88%), S768I (11/69, 15.94%), respectively), L861Q (14/69, 20.29%), Insertion on exon 20 (12/69, 17.39%). EGFR negative cases (n=72) 66/72 (91.67%) male and 6/72 (17.39%) female were assessed for KRAS mutations in Codon 12. Samples assessed included; Blood-30, Sputum-24, FNAC-2, TBLB-12, Pleural fluid-3. 3/72 (4.17%) showed KRAS positive. KRAS mutation status was also found to be unrelated to smoking status as well as cancer stage. The development of molecular pathology into early lung cancer detection and personalized therapy is needed to provide a way forward.

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

"Liquid biopsy" is the analysis of circulating biomarkers from peripheral blood, such as circulating tumour cells (CTCs) and circulating tumour 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 this study, we are examining the clinical significance of isolation of ctDNA from peripheral blood and tissue samples of NSCLC patients, and their analysis using Sanger sequencing with MicroVariant Finder software. Sequencing for EGFR mutations in Exons 18, 19, 20, 21, has been performed on 61/203 cases and 41 controls. Samples assessed include peripheral blood (40/61 cases), FNAC (2/61), Biopsy (12/61), Pleural fluid (4/61), sputum (3/61), bronchial aspirate (1/61) including 55 males and 6 females. 24/61 (39.34%) cases were positive by qRT-PCR for EGFR mutation. Currently, molecular assessment of most patients with NSCLC is done on tissue biopsy which is limited in quantity and difficult to obtain. "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. It is useful in targeted therapies where the development of resistance is almost inevitable and requires reassessment of the molecular profile. However, the extreme rarity of tumor-associated biomarkers in blood further requires 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.

3. Tumour histopathology, extent of dedifferentiation and interstitial lung disease in advanced stage non-small cell carcinoma lung treated with EGFR tyrosine kinase inhibitors

In this study the histopathological features of advanced stage non small cell carcinoma of lung is being correlated with their differentiation, immunohistochemical and molecular features. Tumour cell expression for SP-C, CK-7+, CK20-, Caspase-3, VEGF and the cancer-associated stromal expression of α-SMA, bFGF, MMP-9, VEGF is being studied. This study will help to assess the tumor EGFR response, select patients for gefitinib/TKI therapy as well as to identify predictive factors of ILD, inorder to maximize the clinical benefit and help in improving the survival of lung cancer patients.

4. Study of EGFR mutations by PCR-SSCP in lung cancer patients

EGFR mutation analysis can identify patients responsive to EGFR anti TKI therapy, however the test is costly and requires set up of molecular laboratory and skilled manpower. Single strand conformation polymorphism analysis of specific PCR product (PCR-SSCP) is a basic method to identify genetic aberrations. We hypothesized that initial SSCP analysis can be used for ruling out the common deletion and insertion mutations in Exon 19 and 21 and help in reducing cost of analysis. Therefore, initial screening for EGFR mutation is being done by SSCP with amplification of EGFR gene and its quick heat denaturation followed by non-denaturing PAGE gel electrophoresis. EGFR mutation analysis was done. We are studying the utility of SSCP in comparison with EGFR mutation analysis by qRT-PCR for Exons 18-21 and correlating with pathological features.

5. Immunohistochemistry of lung cancer

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 optimized a panel of lung cancer antibodies using fully automated immunohistochemical analyser, Ventana Benchmark-GX since October 2015. The IHC expression is being studied to (1) confirm the primary site of origin of lung tumour and its categorization: Napsin, p63, p40, TTF-1, CK-7, synaptophysin, Chromogranin-A, CD 45, SP-C etc, (2) to assess the proliferating capability of the tumour cells, Caspase-3 etc, (3) to assess the tumour expression of molecular markers such as KRAS, ALK, EGFR mutations for adjunct therapy, and (4) to assess the metastatic potential of the cancer cells using VEGF-1, α-SMA, bFGF, MMP etc.

Immunohistochemistry panel for lung cancer during the period 2018-19

Antibody	No. of Cases	Antibody	No. of Cases
Napsin	45	EGFR-	24
KRAS	42	EGFR-L	10
Pan CK	38	CD-1a	9
TTF-1	64	S-100	7
Calretinin	18	Chromogranin	13
WT-1	16	B-Actin	3
CK-20	19	P63	9
CK-7	18	CK5/6	9
CEA	45	ALK	1
Synaptophysin	17	P40	14
NSE	10	CD8	2
CD45	11	SPC	5

6. Designing of 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 mortality rate. The therapeutic approaches available to date have limited success and high cost. In present study, polymeric nanoparticles are being designed for drug delivery with desired action at lower dosage and reduced cost. Polycaprolactone nanoparticles were prepared by double emulsion solvent technique and characterized by nanosight, Dynamic light scattering and TEM. The efficacy of pirfenidone loaded nanoparticles was assessed in A549 cell line (before and after treatment with bleomycin (50 mM) and compared with pirfenidone standard dose (5µg) at 2, 4, 6, 12, 24, and 48h. Cells were harvested and TGF β1 mRNA and vimentin protein expression was studied in all the groups: Group I- A549 cells (control), Group II- A549 cells + bleomycin, Group III-A549 cells+bleomycin+pirfenidone and Group IV-A549cells+bleomycin+pirfenidone loaded nanoparticles. On TEM, surface morphology of Pirfenidone-PCL Nps was spherical with mean size 116 nm. DLS revealed Zeta potential of -17.1 mV. An increased expression of TGF β1 and Vimentin by A549 cells was seen after 2 and 24 hours of receiving bleomycin respectively and indicated epithelial mesenchymal transition (EMT) of alveolar epithelial cells. The effect of pirfenidone and pirfenidone-PCL NPs formulation in reversing the EMT, TGF-β1 mRNA and Vimentin expression after bleomycin administration was assessed and compared. This study provides a rational background for future evaluation of pirfenidone loaded nanoparticles as a potential antifibrotic therapy for treating pulmonary fibrosis.

7. Immunohistochemistry of lung fibrosis

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 in order 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 etc), (iii) matrix remodeling (MMP/TIMP, and (iv) angiogenesis (VEGF, FLK-1) etc.

Immunohistochemistry panel for lung fibrosis during the period 2018-19

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

8. Role of vascular endothelial growth factor and transforming growth factor and their receptors in the pathogenesis of bleomycin induced lung fibrosis

Several growth factors including transforming growth factor (TGF), vascular endothelial growth factor (VEGF), fibroblast growth factor (FGF) etc are known to play critical roles in the pathogenesis of pulmonary fibrosis. While these growth factors stimulate the proliferation of lung fibroblasts *in vitro,* their altered expression and release during angiogenesis, aberrant vascular and parenchymal remodelling in lung fibrosis remains controversial. These factors act via tyrosine kinase receptors (VEGFR and FGFR), and serine threonine kinase receptors (TGFR), which in turn, regulate their availability and modulate cell functions. Therefore, protein kinase inhibitors are gaining popularity in the treatment of diseases due to hyperactive protein kinases; cancer, fibrosis and other chronic inflammatory diseases. We summarized the evidence for involvement of VEGF, TGF, FGF and their receptors in the pathogenesis of parenchymal and vascular remodelling in pulmonary fibrosis. VEGF is a proangiogenic mediator which is involved in endothelial cell proliferation, formation of new capillary blood vessels and inducing permeability of blood vessels during the process of tissue repair. In addition, VEGF has been suggested to have profibrotic and fibroproliferative effects. In present study we demonstrate that the main sources of VEGF in the lungs are alveolar epithelial cells, bronchial epithelial cells, airway smooth muscle cells, fibroblasts, endothelial cells and alveolar macrophages. VEGF released by respiratory epithelial cells and parenchymal cells, acts in a paracrine manner on adjacent endothelial cells and is a key factor in the maintenance of endothelial cells. VEGF transcription is induced by hypoxia-inducible factor–1a, which accumulates in the cells under hypoxia and is also increased by TGF-β1. Decreased VEGF signaling arising as a result of oxidative stress caused by bleomycin results in endothelial cell apoptosis, migration impairment, general endothelium dysfunction and vascular remodeling. Vascular rarefaction is seen in the scar tissue when the reduction in VEGF angiogenic expression is paralleled by elevation of angiostatic molecules such as pigment epithelium derived factor and TGF. Nintedanib is an approved triple kinase inhibitor of platelet-derived growth factor receptor (PDGFR), FGFR, VEGFR, and Src family kinase. Presently, we are assessing the effect of NAC, Sildenafil on VEGF, TGF, FGFR expression in bleomycin model.

9. Quantitative analysis of lung elastic fibers in interstitial lung disease

The fibrous connective tissue of the lung comprises of collagen, reticular, and elastic fibers (EF). The proportion of collagen and elastic fibers determines its physical flexibility and elasticity. In patients with lung fibrosis, the increased proportion of EF within fibrotic tissue reduces compliance and makes the lungs stiff. Recent reports have suggested that an increased amount of EF in surgical lung biopsy specimens is an

independent predictor of a poor prognosis in patients with IPF. However, the details regarding the amount and distribution of EF and their quantification in IPF patients remain unknown. The pathological appearance of fibrosing NSIP, pleuroparenchymal fibroelastosis and secondary UIP on hematoxylin-eosin staining are overlapping with that of usual interstitial pneumonia (UIP). The aim of this study was to quantify the EF in the biopsy of different ILDs, identify the differences between them and correlate with the pathological features in ILD patients. Elastic fibers are a useful component of the extracellular matrix and are secreted from a monomer known as tropo-elastin. Verhoeffs Van Gieson tissue stain is used to quantify the elastic fibers. Further the elastic fibres are being quantified on the lung biopsy sections using morphometry. Images are being captured on Nikon eclipse 90i and analyzed under 40X magnification using NIS software.

10. The peroxisome proliferator-activated receptorγ (PPARγ) agonist, pioglitazone regulates transforming growth factor beta-1 (TGF-β1) signalling pathway in the lung

Peroxisome proliferator-activated receptor-gamma (PPAR-gamma) agonists are increasingly used in patients with diabetes, and some studies have suggested a beneficial effect on organ fibrosis, but their effects on lung parenchymal cell growth and extracellular matrix (ECM) turnover are unknown. Previously we have reported pioglitazone to up-regulate insulin IGF-1 and its ligand IGFBP5. *In vitro* study of pioglitazone has shown it to inhibit TGF-β induced procollagen 1 and CTGF expressions in MRC-5 cells (human lung fibroblasts). In present study, we investigated the effect of pioglitazone on TGF-β1 in the type II AECs after intratracheal bleomycin instillation. Bleomycin induced lung injury increased the expression of TGF-β1 in the type II AECs, EMT cells, alveolar interstitial macrophages and interstitial fibroblast/myofibroblasts from day 7 onwards and becomes more marked on succeeding days and persisted on day 35. With pioglitazone treatment, an attenuation of TGF-β1 expression in both type II AECs and the interstitial cells is seen on day 14 which becomes more prominent on day 35. Growth factors such as transforming growth factor beta1 (TGF-β1), connective tissue growth factor (CTGF), fibroblast growth factor (FGF), insulin-like growth factor-1(IGF-1) and platelet derived growth factor (PDGF) have been shown to regulate the growth and differentiation of the AECs. In the present study, we demonstrated the *in vivo* efficacy of pioglitazone in regulating TGF expression inaddition to the IGF axis thereby reducing the TGF-β1 driven profibrotic response in the lung, and proving to be effective in attenuating the pulmonary fibrosis caused by bleomycin.

11. The effect of vitamin A and RA (VARA) on bFGF and SPC expression in bleomycin induced pulmonary fibrosis

Vitamin A (retinol) is a known regulator of immune function and retinoic acid (RA) is a major oxidative metabolite of vitamin A that mediates the vitamin's functions. RA, including all-trans retinoic acid, 9-cis and 13-cis retinoic acid, play important roles in cell growth, differentiation, apoptosis and inflammation. Vitamin A and RA (VARA) regulate T cell differentiation, immune responses and the antibody response. Vitamin A and RA promote differentiation toward Th2 cells and the production of IL-4 and IL-5 or increase the ratio of Th2/ Th1cytokines by reducing the Th1 response. Further RA and TGF-β are shown to induce the expression of microRNA, miR-10a, in Treg cells, thereby reducing the transcriptional repressor Bcl-6, N-Cor etc. These two diverse actions may affect various processes involved in the onset and progression of fibrotic disease. Retinoic acid positively affects the progression of fibrosis and alleviates the accumulation of the extracellular matrix, whereas other studies have reported that retinoic acid exacerbates fibrosis and induces extracellular matrix accumulation. ATRA therapy has been shown to decrease the expression of interleukin-17A (IL-17A), IL-6, NFkB-p65 and TGF-β1, and could alleviate bleomycin-induced pulmonary fibrosis in C57BL/6 male mice.
We assessed the efficacy of VARA in regulating surfactant protein-C (SPC) and fibroblast growth factor (bFGF) in bleomycin model of lung fibrosis. Group I (Bleomycin) – 7^{th}, 14^{th}, 21^{st}, 28^{th}, Group III (Bleomycin + VARA)-- Day 0, 14, 21. The protein expressions of SPC and bFGF were analyzed by immunohistochemistry and quantified by Nikon NIS imaging software and PRISM 5. VARA therapy resulted in reduction in the expression of SPC and bFGF from Day 7^{th} to Day 28^{th}. This was seen to correlate with attenuation of lung fibrosis. The bFGF is a profibrotic growth factor that stimulates the proliferation of fibroblasts and the migration of myofibroblasts. It 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. VARA therapy reduces the bFGF and SPC and has a protective role by restricting fibroblast prolifearation as well as maintaining epithelial integrity after bleomycin-induced lung injury.

12. The phosphodiesterase inhibitor sildenafil modulates toll-like receptor expression and NF-κB signaling during immunopathogenesis of bleomycin induced lung fibrosis

The toll-like receptors (TLRs) regulate pulmonary fibrosis by sensing alveolar epithelial cell damage and bridging the host innate and adaptive immune responses. The activation and function of TLRs determines the outcome as tissue repair or fibrosis. Therefore, in the present study we assessed the time course of expression of TLR-2,4 and NF-κB signalling in bleomycin model and studied the effect of phosphodiesterase inhibitor, sildenafil on the same. Male Wistar rats were divided into three groups: Group I (saline control, n=24) and Group II (intratracheal bleomycin, 7 U/kg/animal, n=24), Group III (Bleomycin+Sildenafil, 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 signalling resulted in macrophage accumulation and progression of lung parenchymal remodelling. These results collectively indicate that the 35 kDa HA fragment activates the host innate immune response by the sequential upregulation of TLR-2, 4. Sildenafil therapy resulted in significant upregulation of TLR-4 mRNA levels on day 28 (fold change 3.5). TLR4 signalling has been divided into MyD88-dependent and MyD88-independent pathways. TLR-4 antifibrotic role may be exerted either through effective clearance of damaged cells by autophagy or regulation of MyD88-independent anti-inflammatory pathway that involves induction of IL-1R antagonist. Increasing evidence suggests that immune modulators such as TLR4 ligands or agonists could also be successfully used as therapeutic agents in infectious liver diseases, such as HBV and HCV.

13. Bosentan therapy modulates miR-21-TGF-β1-bFGF-Let-7d pathway and attenuates both the development of pulmonary artery hypertension and parenchymal fibrosis after bleomycin injury

Pulmonary artery hypertension (PAH) develops in 30-40% cases of pulmonary fibrosis. PAH pathogenesis is associated with differential expression of miRNAs, endothelin-1 (ET-1) and transforming growth factor-beta (TGF-β). ET-1 is a potent pro-fibrotic peptide and miR-21 inhibits its receptor (endothelin ET-B), drives VSMC differentiation and fibrosis while Let-7d binds to endothelin-1and is proangiogenic. TGF-β upregulate the expression of prepro ET-1-mRNA and ET-1 production in rat and human pulmonary arterial smooth muscle cells. ET-1 is a potent vasoconstrictor, which also mediates increased vascular permeability in lung injury. Due to the multiple influences of ET-1 in vascular remodelling, its potential as a target for therapy of pulmonary hypertension and vascular remodelling in pulmonary fibrosis was evaluated. Bosentan is a dual ET receptor (ET-A and ET-B) antagonist that acts via two receptors (1) ET-A on vascular smooth muscle cells (VSMC) (2) ET-B on VSMC, endothelial cells and fibroblast. It induces vasoconstriction, fibrosis, hypertrophy, hyperplasia and increases the vascular permeability. Wistar rats were euthanized on day 7, 14, 28 after bleomycin/saline instillation: Group I (control, n=18), Group II (bleomycin, 7 IU/kg, n=18), Group III (Bleomycin+Bosentan, 100mg/kg/d, n=18). Let-7d, miR-21, bFGF, TGF-β1 mRNA and protein levels were assessed. Bleomycin instillation caused upregulation of miR 21 and downregulation of Let-7d from day 7. An associated upregulation of TGF-β1 and bFGF mRNA and protein levels was seen. The bFGF increased in AECs, peribronchiolar fibroblasts from day 7. Progressive perivascular inflammation, vasoconstriction and VSMCH were seen. The endothelium expressed TGF and FGF resulting in VSMCH and endothelial-mesenchymal (Endo-MT) transition. This is associated with miR-21 upregulation suggestive of role of miR-21 in promoting vascular remodelling. Bosentan treatment significantly reduced perivascular inflammation and proliferation of both cell types to near-control levels, indicating that ET signalling plays a critical role in the uncontrolled proliferation of pulmonary vascular cells in PH. The miR-21-TGF-β1-bFGF-Let-7d pathway plays a key regulatory role in the pathogenesis of PAH. TGF-β1 has an autoregulatory feedback loop with miR-21 and bFGF. Bosentan therapy, downregulates miR-21, reduces TGF-β1 signalling, upregulates let 7d and attenuates VSMCH and pulmonary hypertension.

14. The phosphodiesterase 5 inhibitor sildenafil regulates caveolin-1 and TGF signalling and attenuates lung fibrosis

The caveolae are major components of signal trafficking and caveolin-1 is important in influencing signalling cascades that regulate parenchymal and vascular remodelling. The effect of sildenafil citrate on caveolin-1 and α-SMA expression has been studied in cavernous tissue. In this study, early administration of sildenafil is seen to elicit caveolin-1 expression and increase nitric oxide (NO) signalling via endothelial nitric oxide synthase, which also localizes in the caveolae. Therefore, the present study was designed to explore the possible role of sildenafil in regulation of caveolin-1 expression and modulation of TGF-β signaling pathway in bleomycin

model of pulmonary fibrosis. Sildenafil (50 mg/kg/day P.O) was administered to bleomycin instilled animals. The time course of caveolin-1 and TGF-β1 expression was evaluated on days 7, 14, 28. There was decrease in the caveolin-1 expression and upregulatin of TGF-β1 in bleomycin instilled rats. Sildenafil treatment significantly attenuated TGF-β1 and bleomycin-induced parenchymal remodeling and vasoconstriction. Moreover, it increased the caveolin expression in alveolar epithelial cells (AECs) and endothelial cells. It is concluded that sildenafil attenuates TGF-beta signaling by restoring caveolin-1 resulting in attenuation of pulmonary fibrosis and vasodilatation. Indeed, its combined effect on parenchymal and vascular remodeling at the cellular level makes it a tempting and logical therapeutic agent in treating IPF patients who are known to develop WHO Grade III pulmonary hypertension.

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

The pulmonary extracellular matrix (ECM) is a highly dynamic structure that continuously undergoes controlled remodelling mediated by specific enzymes such as metalloproteinases. The ECM also sequesters and locally releases growth factors, epidermal growth factor, fibroblast growth factor (FGF), etc. Dysregulation of ECM composition and structure contributes to pathogenesis of lung fibrosis, cancer etc. The role of the bFGF/FGFR1 and FGFR2 signalling pathway was assessed in the regulation of pulmonary ECM remodeling. Male Wistar rats (n=24), 120-150 grams, were divided into Group I: control (intratracheal 0.9% saline), Group II: experimental (intratracheal bleomycin sulphate, bleo; 7 I.U/kg bw). Animals were sacrificed on day 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). Concomitant upregulation of the bFGF-FGFR1-FGFR2 signalling pathway occurs in the cellular phase of bleomycin induced lung injury upto day 14. The bronchial epithelial cells and alveolar macrophages are the main cells in which upregulation is seen. The fibroblast growth factors after binding with their FGFR activate downstream signalling pathways that are central to cell survival. Hence, targeting the fibroblast growth factors has been suggested to be an important therapeutic option for pulmonary fibrosis. Taken together, the data suggest a prominent role of the FGF/FGFR signalling pathway in pulmonary fibrotic diseases.

Pharmacology

Research

1. Smart regulation for antibiotic use in India: understanding, innovating and improving compliance

Antimicrobial resistance (AMR) contributes to over 700,000 annual deaths globally, and in India alone, more than 58,000 children die every year due to resistant infections. It is estimated that by 2050, 10 million lives a year and a cumulative 100 trillion USD of economic output will be at risk if proactive solutions are not put in place now to slow drug resistance (O'Neill Commission 2016). The development and spread of resistance occurs through complex direct and indirect pathways, involving human and animal health, food production, and effluent from pharmaceutical manufacture, hospitals and farms. The containment of AMR is a multi-faceted task that needs a one-health approach as suggested in the World Health Organization's (WHO) 2015 Global Action Plan (GAP) on AMR. Countries including India have aligned their National Action Plans (NAPs) on AMR with this international guidance. One of the important links for various activities for AMR containment is the appropriate use of antibiotics to reduce selection pressure on microbes.

The project has two main aims: (1) to better understand the various problems surrounding the regulation of antimicrobial resistance (AMR) containment in India and (2) to improve the situation by applying the concepts and methods of 'smart regulation'. Smart regulation embraces "flexible, imaginative and innovative forms of social control."

Key features include: (i) supplementing traditional sanctions, *e.g*. fines with various forms of 'soft regulation', (ii) stakeholder engagement and input into regulation and (iii) seeking win-win outcomes whenever possible

We have chosen four key sectors particularly affected by AMR that will be studied in detail in three geographical contexts, *i.e.* within two Indian states and at the national level. The four sectors are: (1) OTC antibiotic sales at pharmacies without valid prescription, (2) poultry farmers using antibiotics (including as a growth factor), (3) hospital AMR containment and (4) pharma industry effluents and AMR

Geographically, we aim to conduct this research at the national level and in the two selected states of Haryana and Telengana. We will engage sector-specific regulators and their regulatory targets right from the early phases of the project in order to better understand their perspectives and interests. We will also encourage 'buy-in' by giving them the opportunity to shape content. Our multi-disciplinary and international team of researchers has the skills, knowledge, experience and professional connections needed to successfully implement the project.

Institute organized in collaboration with World Health Organization [WHO] a Workshop to Develop Capacity of Pharmacists for Optimal Use of Antibiotics on February 28, 2019.

2. 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

This study was conducted to validate therapeutic effects of yoga (traditional medicine system) on pulmonary functions and quality of life parameters in bronchial asthma patients. Mild to moderate asthmatic patients were selected from OPD of Vallabhbhai Patel Chest Institute and divided into two groups: Group I, patients with anti-asthma therapy; Group II, patients with anti-asthma treatment plus yogic intervention for 50 minutes daily. Various parameters such as fractional exhaled nitric oxide (FeNO), quality of life (QoL), oxidative stress markers and pulmonary functions test (PFT) were evaluated in both groups at baseline and after three months of treatment. Quality of life parameters was assessed by a questionnaire developed by McMaster University, Canada. Significant improvement in PFT (FEV_1 and FVC) and QoL parameters was observed in Group II patients. Significantly marked reduction in oxidative (malondialdehydelevels and superoxide dismutase levels) and nitrosative (fractional exhaled nitric oxide) parameters was also observed in Group II as compared to Group I. Therefore, the results showed improved antioxidant-prooxidant balance due to yogic intervention, which could have improved the efficacy of conventional treatment and can be given as an adjunct therapy.

3. 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 study was designed to assess the role of yogic intervention in improving pulmonary functions, inflammatory markers, oxidative stress and health status in patients of chronic obstructive pulmonary disease (COPD). Patients were selected and enrolled from out-patient department (OPD) of the Viswanathan Chest Hospital, Vallabhbhai Patel Chest Institute, Delhi and divided into Group I (control group, taking conventional drug treatment) and Group II (yogic intervention for 1 hour daily with conventional drug treatment). Various parameters such as pulmonary functions, viz. FEV_1 (forced expiratory volume in 1 sec), FVC (force vital capacity), FEV1/FVC ratio, FeNO, 6-minute walking test (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. Results showed significant improvement in pulmonary function test and decreased levels of fractional exhaled nitric oxide (FeNO) in Group II as compared to group I. 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. More patients are being recruited as per proposal submitted to AYUSH to complete the study.

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

There has always been a need to identify effective and safe remedy for the treatment of bronchial asthma in view of limited efficacy of available asthmatic agents due to underlying side effects, such as immune suppression, cardiac abnormalities, hyperglycemia, muscle tremor and hypokalemia etc. Therefore, this 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 models of bronchial asthma and airway remodelling.The rats were immunized with ovalbumin (50 mg) and challenged from 15 to 21 days with 2% OVA aerosol for 20 minutes per day. After 24 hours of ovalbumin challenge, rats were anesthetized and blood and BAL samples were collected for assay of Hydroxyproline, TGF-β and IL-13. Pretreatment with UNIM-352 attenuated above parameters at both dose levels in both blood and BAL fluid as compared to control group. The results were also comparable with the standard drug, Prednisolone. Administration of UNIM-352 and optimized preparations of UNIM-352 attenuated the levels of eosinophils and neutrophils, the effector cells in inflammation of bronchial asthma. Effect of UNIM-352 and optimized preparations of UNIM-352 were assessed on mast cell degranulation and mortality in ovalbumin sensitized and challenged mice. Treatment with UNIM-352 and optimized preparations of UNIM-352 reduced degranulation of mast cell as compared with experimental control group and all the optimized preparations reduced the mast cell degranulation by greater magnitude as compared to UNIM-352, which shows the anti-anaphylactic role of optimized preparations of UNIM-352.

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

The present study evaluated the adaptogenic effects of *Withania somnifera* (*Ashwagandha*) leaf extract using pharmacological and biochemical techniques and investigated the possible cellular and molecular mechanisms involved. Chronic RS exposure leads to differential modulation of cytokine released from various immune cells. There was marked decrease in plasma IL-4 levels after RS which was not affected significantly after WSRE or WSLE pre-treatment. However, there was increase in IL-4 levels with diazepam treatment. On the other hand, there were consistent reductions in the IFN-γ levels in stressed rats which were reverted towards basal levels with *Withania somnifera* root and leaf extract (WSRE and WSLE). These effects were comparable with those seen with diazepam treatment. Assay of oxidative stress markers showed that such chronic RS resulted in elevation of malondialdehyde (MDA) levels while levels of glutathione (GSH) and NOx were lowered when compared to control group data. The MDA was attenuated after WSRE and WSLE pretreatment and GSH increased upto the basal level after drug treatment. In conclusion, *Withania somnifera* ameliorated chronic RS induced neurobehavioral, neuroendocrinal effects and immune responses. The WSRE and WSLE alleviated the suppressed humoral as well as cell-mediated immune responses in a dose related manner, suggesting its immunomodulatory profile. The effects of WSRE and WSLE were comparable to each other, and thus, leaf extract can also be used in place of root extract as this was help in preventing the loss of biomass of this plant and is of pharmacoeconomic value.

6. 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 *Lepidagathistrinervis* 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. *Lepidagathistrinervis* (100, 200 and 400 mg/kg) and *Chlorophytumborivilianum* and *Cocculushirsutus,* attenuated the level of ovalbumin specific IgE and mast cell degranulation as compared to vehicle treated control group. All these effects were comparable to positive control, prednisolone. Marked reduction inoxidative parameters, *i.e.* Malondialdehyde (MDA) and increase in reduced glutathione (GSH) levels were observed in both traditional herbal preparations in blood and BAL fluid. Reduced bronchial hyperreactivity in response to different doses of methacholine was observed as evidenced by Enhanced Pause (Penh) using whole body plethysmography. Therefore, both traditional herbal preparations *Lepidagathistrinervis* and *Chlorophytumborivilianum* and *Cocculushirsutus* showed reduction in bronchial hyper-responsiveness in experimental model of bronchial asthma.

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

The present study has been designed to validate anti-asthmatic effects of *Adiantumvenustum* and *Lychniscoronaria* using standardized experimental animal models of bronchial asthma. In an acute model of airway inflammation, rats were immunized with ovalbumin (10 mg/rat, i.p.) adsorbed to 10μg of aluminium hydroxide on day 0. Prior 14 days after immunization, challenge treatment with ovalbumin (1 mg per rat) was carried out. After 24 hours of ovalbumin challenge, airway hyper-responsiveness was measured in response to inhaled methacholine using whole body plethysmography. The animals were anesthetized and blood and BAL fluid were collected for the estimation of TNF-α, IL-4, NF-κb and OVA specific IgE. Both *Adiantumvenustum* and *Lychniscoronaria* attenuated these pro-inflammatory and Th-2 cytokines. Similarly, in chronic model of bronchial asthma, animals were immunized with ovalbumin (emulsified with aluminium hydroxide) on day 1 followed by challenge with aerosolized ovalbumin from day 15-21. After 21 days, animals were anesthetized and blood and BAL were collected for assay of various biochemical test. The lungs of each animal were removed for hydroxyproline estimation and histopathological examinations. The results showed reduction in both the levels of collagen and goble

8. 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 evaluate the mechanism of action of *Withania somnifera* extract involved in cognition impairment in high fat diet- streptozotocin (HFD-STZ) induced diabetic rats. The effects of *Withania somnifera* extract on cognitive functions in T2DM, i.e. high fat diet + streptozotocin (HFD-STZ) treated rats were evaluated by using passive avoidance test and Morris water maze test. Animals were fed with in-house prepared high fat diet (HFD) for a period of 8 weeks followed by streptozotocin (STZ) injection. After 4 weeks, the fasting blood glucose levels were tested from the tail vein by glucometer. Rats with fasting glucose level ≥200mg/dLwere considered as diabetic and screened for cognition on Morris water maze (MWM) at the end of treatment with various drugs. In brief, a circular tank (160 cm diameter and 50 cm height) was filled with warm water (22-24 °C) to a height of 30 cm. The pool area was divided into four quadrants equally spaced along the circumference of the pool. A circular escape platform was fixed in the middle of quadrant NE. Rats received the four non-visible platform trials (one from each starting point) everyday for the first 5 days and a probe trial on the 6^{th} day by removing the platform. The time taken by the animal to reach the platform (escape latency) was recorded during the trial. The mean escape latency of the daily trials was calculated and found to be reduced with *Withania somnifera* in a dose-dependent manner.

9. Experimental studies on the hepatoprotective and immunomodulatory effects of *Dawa-Ul-Kurkum,* a polyherbal Unani 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 polyherbal unani preparation. *Dawa-Ul-Kurkum* contains *Sumbul-ul-Teeb, Mur Makki, Salcekha, Quas, Shagufa-e-Izkhar, Darchini, Zafran* with *Sharab-e-musallas* and *Asal* in sufficient quantity to make up the required volume. This study was designed to validate the effects of this compound and its efficacy in experimental model of dysfunction and to assessed the cellular and molecular mechanisms involved in mediating such effects. The two experimental models of hepatotoxicity have been standardized in rats, viz. paracetamol induced liver damage and anti-tubercular therapy (ATT) induced hepatotoxicity. Paracetamol was administered at a dose of 2g/kg; p.o. daily for 14 days. In another model, liver damage was induced by ATT (combination of rifampicin + isoniazid + pyrazinamide was administered daily for 28 days orally). The blood samples were collected after 14 days in paracetamol treated and after 28 days in ATT treated animals to assess the hepatotoxicity. After blood collection, animals were sacrificed and liver tissue was collected for histopathological studies and evaluation of oxidative stress markers. The results showed that the paracetamol and ATT treatment significantly increased the markers of oxidative stress, *i.e.* enhanced MDA and reduced GSH levels. Histopathological examination of rat liver showed changes of inflammation, degeneration and necrosis as compared to normal hepatic architecture seen in control rats. Administration of silymarin reversed the histological changes induced by either paracetamol or ATT treatment in separate groups.

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 training in healthy and chronic respiratory disease patients.

Data collection is complete and project is closed. Preliminary analysis has shown that IPC does not impart hypoxic tolerance.

2. Cognitive performance after short duration sub-maximal exercise in young adults

Exercise has been implicated to improve many different tests of brain function. It has been observed that by performing a moderate intensity aerobic exercise (70%-80% HRmax or sub-maximal xercise); there is an improvement in working memory. In situations of conflicts, *e.g.* short duration sortie by air force personnel, a strategy is required that can improve the cognitive performance of defense personnel with minimum time consumption. Objective of this study is to explore whether short duration of sub-maximal exercise improves cognitive performance.

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 Hospital (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 and MD) 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 Anthracotic pigment in transbronchial lung biopsy: an innocent bystander or pathogenic agent for parenchymal lung disease

Anthracosis has been recently identified as a cause of bronchitis and bronchial stenosis in both developing and developed countries in the world. However, its exact nature whether as an innocent bystander or pathogenic agent for parenchymal lung disease is unknown. We retrospectively analysed 384 transbronchial lung biopsies (TBLBs) received at Department of Pathology over a seven-year period (August 2010 to August 2016). Thirteen TBLBs showed normal lung parenchyma were taken as controls; 32 (8.3%) TBLBs showed deposition of anthracotic pigment, with or without fibrosis and were further studied. Masson-Trichrome and Ziehl-Neelsen stains were used to confirm the diagnosis of fibrosis and tuberculosis, respectively. The TBLBs were histopathologically categorized into: Group 1: normal lung parenchyma, (controls, n=13, 3.4%); Group 2: pigment deposition with fibrotic parenchymal reaction (n=11, 34.4%); Group 3: pigment deposition with inflammatory parenchymal reaction (n=11, 34.4%); and Group 4: pigment deposition with granulomatous parenchymal reaction (n=10, 31.3%). In two cases of Group 2 and one case of Group 3, parenchymal deposits of silicate crystals were also identified by polarizing microscopy. Anthracosis does not appear to be an innocent bystander and needs to be meticulously assessed for its role as pathogenic agent for parenchymal lung disease in all cases. Our observations suggest that identifying the pigment deposited and correlation with the underlying pathology in the limited tissue sample available can help in reaching a definitive diagnosis.

2 Consensus statement for the diagnosis and treatment of idiopathic pulmonary fibrosis in resource-constrained settings

Idiopathic pulmonary fibrosis (IPF) is a specific type of chronic fibrosing interstitial lung disease (ILD) that is progressive in course. Although evidence-based guidelines for IPF are available, these are difficult to interpret for the average physician and may not be suitable for use in resource-constrained settings. There was an unmet need to formulate guidelines that are pragmatic, easy to understand and suited for application in resource-limited settings. This statement was made by a group of expert pulmonologists. Twenty-five questions regarding diagnosis and management of IPF were framed. A literature search was conducted using the PubMed and EmBase databases. The expert group discussed available evidence relevant to each question and recommendations were arrived at by consensus. A thorough clinical and laboratory evaluation should be performed in patients suspected to have ILDs and potential underlying causes should be ruled out. A high resolution computed tomography (HRCT) of the chest is essential to identify the pattern of ILD. The need for a lung biopsy should be decided based on the appearance on the HRCT. Once a diagnosis of IPF is made, anti-fibrotic drugs (pirfenidone or nintedanib) should be offered after discussing the expected benefits and potential adverse effects with the patient. Recommendations have been made on other issues in the management of IPF, such as management of cough and dyspnea, role of supplemental oxygen, mechanical ventilation and lung transplantation. This consensus statement provides practical and easy-to-use recommendations for the diagnosis and management of IPF in resource-limited settings.

3 National Tobacco Quitline Services – A comparative study of prevalence of smoking and smokeless tobacco use in India: a brief one-year report

With an increasing prevalence of tobacco use in India in the last few years, Ministry of Health and Family Welfare, Government of India launched the first ever "National Tobacco Quitline Services (NTQLS) on 30th May, 2016 at Vallabhbhai Patel Chest Institute, University of Delhi (North Campus), Delhi. This is a telephone-based tobacco cessation service, an important component of many tobacco control programmes. NTQLS is established to help a person who wants to quit his/her habit of tobacco use. Services at NTQLS are available daily from 8 AM to 8 PM through a National toll-free number 1800-11-2356 in both English and Hindi, except on Monday. Six counsellors were present at a time both during morning and evening shift. A total of 32712 callers were registered from 30th May 2016 to 31st March 2019. The comparative analysis was done between the smokers (n=7331) and smokeless tobacco users (n=21319) those registered at NTQLS using statistical package for the social sciences (SPSS, version 22). Tobacco smokers who used smokeless tobacco (n=4062) were excluded from the present study. A total of 1366 smokers and 3169 smokeless tobacco users were studied. Tobacco consumption was higher in males as compared to females in both the groups. Individuals in the age group of 25 to 64 years were found to be more prone to smokeless tobacco consumption as compared to smoking tobacco (69.5% *versus* 67.6%). Results at NTQLS indicate this to be helpful in motivating people to quit or stop the use of tobacco. Overall findings revealed a significant reduction in number of tobacco smokers as compared to users of smokeless tobacco at the end of one year of study period after availing NTQLS services for quitting.

4 Asthma control test and correlation with spirometry and inflammatory markers in asthma patients at a tertiary care centre in India

Asthma control test (ACT) is a simple, quick and accurate tool to assess asthma control. The present study was designed to investigate the correlation between, ACT, spirometry variables and markers of airway inflammation. Seventy-five patients with bronchial asthma underwent baseline spirometry, fractional exhaled nitric oxide (FeNO), serum total immunoglobulin E (TIgE), high-sensitivity C-reactive protein (hs-CRP) and interleukin (IL)-6, IL-10 and IL-13 measurements. After four weeks, patients were followed up with the same set of investigations. ACT questionnaire was completed without any directions. Of 75 patients, bronchial asthma was controlled poorly in 18, partly in 35 and totally controlled in 22. The forced expiratory volume in one second (FEV_1) (%) at the second visit was lowest in the poorly control group (76.94±14.20 *versus* 84.06±11.95 *versus* 91.50±10.66; $p<0.002$). The ratio of FEV_1 to forced vital capacity (FVC) at the second visit showed lowest values (71.99±10.59 *versus* 77.70±9.05 *versus* 85.77±8.37; $p<0.001$) in patients with poorly control asthma. Notably, the change in FeNO, TIgE and IL-6 levels in two visits reached significant levels ($p<0.05$). Using the step-wise method for regression analysis, ΔFeNO, FEV_1/FVC and ΔTIgE level explain a substantial amount of the variance in the ACT score ($F [1, 71] = 33.70$, $p<0.001$, $R2 = 0.58$, R2 Adjusted = 0.57). Results of the present study showed negative correlation between ΔFeNO and ΔTIgE and positive correlation of FEV_1/FVC at the second visit with statistical significance at $p<0.001$. The present study emphasises on combined approach including clinical features (ACT), spirometry variable (FEV_1/FVC) and airway inflammatory markers (FeNO) for documenting the precise control of asthma at the follow-up visit.

5 Demographic profile, smoking cessation interventions and continuous abstinence of tobacco users at two years

Vallabhbhai Patel Chest Institute, Delhi is providing tobacco cessation services since November 2001. Since then many tobacco users visited and availed these services. This study was undertaken to assess the demographic profile and the abstinence rate of the tobacco users at two years, outcomes of a cessation clinic in India, its success rate, type of people enrolling for cessation services, type of tobacco and tobacco dependence. Tobacco cessation counselling and pharmacotherapy, if required, were provided to tobacco users registered at Tobacco Cessation Centre (TCC) of our Institute from November 2001 to December 2016. During counselling, demographic details and details of tobacco use were obtained. Brief intervention strategies of RAJKUMAR (R=Reaching to the subject, A=Assess the stage of change, J=Judge the severity, K=Know the risky situations, U=Use coping skills, M=Medication required or not, A=Arrange follow up, R=Re-evaluation) were applied. Out of a total 7231 registered tobacco users, 7010 (97%) were males with a mean age (±SD) of 42.2 (±14.9) years. Most of the subjects (81%) belonged to urban areas. Majority of them (58.8%) were smokers, with 21.7% severly

dependent on tobacco. Overall, continuous abstinence rate was observed to be 53.7%, 47.7%, 38.7%, 31%, 29.5%, 28.8% and 24% at 1, 3, 6, 9, 12, 18 and 24 months, respectively. In non-pharmacotherapy group, continuous abstinence rate for the same period was 55.3%, 46.1%, 35%, 23.9%, 22.4%, 22% and 18.3%, respectively, while in the pharmacotherapy group it was 51.1%, 50.1%, 44.5%, 41.8%, 40.3%, 36.4%, and 32.3%, respectively. Present study showed that tobacco users in the age group of 30-40 years are more interested to quit tobacco. A significant number of tobacco users (24%) continuously abstain from using tobacco for more than two years. Our results suggest that those using pharmacotherapy for tobacco cessation achieve a higher rate of abstinence. A 10-minute behavioural counselling was also found to be effective in reducing and/or quitting tobacco use.

6 Joint Indian Chest Society-National College of Chest Physicians (India) Guidelines for Spirometry

Although a simple and useful pulmonary function test, spirometry remains underutilized in India. The Indian Chest Society and National College of Chest Physicians (India) jointly supported an expert group to provide recommendations for spirometry in India. Based on a scientific grading of available published evidence, as well as other international recommendations, we propose a consensus statement for planning, performing and interpreting spirometry in a systematic manner across all levels of health-care in India. We stress the use of standard equipment, and the need for quality control, to optimize testing. Important technical requirements for patient selection, and proper conduct of the vital capacity maneuver, are outlined. A brief algorithm to interpret and report spirometric data using minimal and most important variables is presented. The use of statistically valid lower limits of normality during interpretation is emphasized, and a listing of Indian reference equations is provided for this purpose. Other important issues such as peak expiratory flow, bronchodilator reversibility testing, and technician training are also discussed. We hope that this document will improve use of spirometry in a standardized fashion across diverse settings in India.

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.

DM Degrees (Ongoing)

(Session: 2018-2021)

S. No.	Name (Discipline)	Title of Theses	Supervisor(s)
1.	Dr Kapil Kumar (Pulmonary Medicine)	Comparison of COPD characteristics in smokers and non-smokers	Prof. Raj Kumar
2.	Dr Sankararaman N (Pulmonary Medicine)	Clinical, serological, functional and radiological profile of interstitial lung disease patients in a tertiary care centre	Prof. Raj Kumar

MD Degrees (Awarded)

(Session: 2015-2018)

Name	Discipline
Dr Ambuj Kumar	Pulmonary Medicine
Dr Anshu Priya	Pulmonary Medicine
Dr Arya Gopi	Pulmonary Medicine
Dr Vidushi Rathi	Pulmonary Medicine
Dr Gulvir Singh	Pulmonary Medicine
Dr Bhagwan Singh Patidar	Biochemistry
Dr Gargi Upadhyaya	Microbiology
Dr Abhyanchal Kishore Jha	Physiology

MD Theses (Submitted)

(Session: 2016-2019)

S. No.	Name (Discipline)	Title of Theses	Supervisor(s)
1.	Dr Lovika Lakhtakia (Pulmonary Medicine)	Spectrum of pulmonary aspergillosis in treated patients of pulmonary tuberculosis	Prof. Raj Kumar
2.	Dr Naveen Vennilavan RA (Pulmonary Medicine)	Characterisation of phenotype in asthma subgroups	Prof. Raj Kumar
3.	Dr Neha Kaushik (Pulmonary Medicine)	Effect of anxiety and depression on quality of life in interstitial lung diseases	Prof. 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 immunomodulatory effects of *Withania somnifera* - leaf and root extracts, in experimental animals	Dr Kavita Gulati and Prof. A. Ray

MD Theses (Ongoing)

(Session: 2017-2020)

S. No.	Name (Discipline)	Title of Theses	Supervisor(s)
1.	Dr Priyadarshini S (Pulmonary Medicine)	Occurrence of subclinical interstinal lung disease in obstructive sleep apnoea	Prof. Raj Kumar
2..	Dr Tome Kamgo (Pulmonary Medicine)	Occurrence of obstructive sleep apnoea in patients of interstitial lung disease	Prof. Raj Kumar
3.	Dr Akshit Gupta (Pulmonary Medicine)	Study on sinonasal involvement in pulmonary sarcoidosis	Dr B.K. Menon
4.	Dr Himanshu Saini (Pulmonary Medicine)	Study of level of inducible protein-10 (IP-10) in tuberculosis	Dr B.K. Menon
5.	Dr Tonushyam Sonowal (Microbiology)	Bacterial infection in chronic obstructive pulmonary disease (COPD) with special reference to atypical bacteria	Dr Malini Shariff

MD – Ist Year

(Session: 2018-2021)

Name	Discipline
Dr Vignesh Kumar K	Pulmonary Medicine
Dr Rahul Kumar Meena	Pulmonary Medicine
Dr Ahmed Safwan M	Pulmonary Medicine
Dr Vatsal Bhushan Gupta	Pulmonary Medicine
Dr Anupam Prakash	Pulmonary Medicine

PhD Awarded/Submitted

S. No.	Name (Discipline)	Title of Theses	Supervisor(s)	Status
1.	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	Awarded
2.	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	Awarded
3.	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	Awarded
4.	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)	Awarded
5.	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	Awarded
6.	Mr Lakshmi Kanth Kotarkonda (Physiology)	An insight into the mechanisms of bleomycin induced pulmonary fibrosis	Prof. K. Ravi	Awarded
7.	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	Awarded
8.	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	Awarded
9.	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)	Awarded

S. No.	Name (Discipline)	Title of Theses	Supervisor(s)	Status
10.	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	Submitted
11.	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	Submitted
12.	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	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.	Mr Sanjesh Saini (Microbiology)	Role of micro-RNA in pathogenesis of influenza A virus infection	Dr Malini Shariff and Dr Madhu Khanna	2015
4.	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
5.	Ms Tanushri Nandi (Microbiology)	Anti-influenza activity of immune modulatory peptides	Dr Madhu Khanna and Prof. Nirupama Trehanpati, Additional Professor, Department of Molecular Immunology, Institute of Liver and Biliary Sciences, New Delhi	2017
6.	Mr Kamal Srivastava (Microbiology)	Evaluation of an arrary of PE-PPE gene for potential use in a diagnostic assay to identify *M. tuberculosis*	Dr Mandira Varma-Basil and Dr Sadhna Sharma Miranda House, University of Delhi	2017
7.	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
8.	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

S. No.	Name (Discipline)	Title of Theses	Supervisor(s)	Year of Registration
9.	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
10.	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
11.	Mr Anil Kumar Mavi (PhD 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
12.	Mr Kamal Singh (Pulmonary Medicine)	Indoor air pollution exposures and asthma in children	Prof. Raj Kumar	2017

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	Awarded
2.	Ms Karuna Sharma (PhD Biochemistry) Faculty of Medical Sciences, University of Delhi, Delhi	Genetic polymorphism of matrixmetalloproteinases-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	Awarded
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 (Deptartment of Medicine, RML Hospital, PGIMER & RML Hospital, New Delhi) and Dr Anuradha Chowdhary	Submitted
4.	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	Submitted
5.	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	Submitted
6.	Dr Anamika MS (Otorhinolaryngology 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 rhinosinusities	Dr A. Chakravarti (LHMC and Associated Hospitals, New Delhi) and Prof. Raj Kumar	Submitted

S. No.	Name (Discipline) and Institution's Name	Title of Theses	Supervisor(s)	Status
7.	Ms Smriti Gupta (PhD Biochemistry)	Understanding chronic obstructive pulmonary disease by studying single nucleotide polymorphism in Delhi-NCR population	Dr Ajit Kumar (Department of Chemistry, SRM University, Delhi-NCR, Sonepat, Haryana); Dr Anju Bhatnagar, (Rajan Babu Institute for Pulmonary Medicine & Tuberculosis [RBIPMT], Delhi) and Dr Viswajeet Rohil	Ongoing
8.	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
9.	Mr Nilanshu Manocha (PhD Biomedical Sciences) Amity Institute of Virology and Immunology, Amity University, Noida (UP)	Study on the generation of peptide immunogen against dengue virus	Dr Prashant Kumar (Amity Institute of Virology and Immunology, Amity University, Noida [UP]) and Dr Madhu Khanna	Ongoing
10.	Mr Manoj Kumar (PhD Applied Chemistry) Department of Applied Chemistry, SoVSAS, Gautam Buddha University (GBU) 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 [GBU] Greater Noida [UP]) and Prof. Raj Kumar	Ongoing

Distinguished Visitors

- Prof. Address Malata and Prof. Mauakowa Malata of Malawi University of Science and Technology visited the Institute on September 17, 2018

Awards/Honours

Prof. S.K. Bansal

- Secretary General, Biotechnology Society of India
- Vice-President, Association of Clinical Biochemists of India (Delhi Chapter)

Prof. Raj Kumar

- **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
- **University Representative,** Medical Council of India, Government of India
- **Expert,** Guidelines for COPD/Asthma for their inclusion under National Centre for Disease Control (NCDC), Delhi.
- **Member,** *Nasha Mukti Abhiyan* Task Force (including Tobacco, Alcohol, and Substance abuse) under National Health Policy-2017, Ministry of Health and Family Welfare, Government of India, New Delhi
- **Expert Member,** Joint Scientific Advisory Committee, ICMR, New Delhi
- **ESDA Global Green Award-2019,** at International Conference on Global Environmental Challenges Human Health and Sustainable Development, New Delhi

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

- **WHO Consultant,** to develop early implementation program for Antifungal resistance in Surveillance for GLASS
- **Editor,** *FEMS Pathogens & Disease* (Oxford University Press) 2018
- **Chief Editor,** Fungal Pathogenesis, *Frontiers in Cellular and Infection Microbiology,* 2018
- **Section Editor,** Antifungal Resistance, *Journal of Global Antimicrobial Resistance,* 2018

Dr Madhu Khanna

- Travel Award, ISIRV Conference on March 31 – April 02, 2019, Siena, Italy.

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"
- **Member,** Advisory Group on WHO "Fair Medicine Pricing Forum"
- **Member,** Advisory Panel, *Journal of Pharmaceutical Policy and Practice*
- **Invited Member,** UK Research Innovation for the launch of UK Research and Innovation India, and to celebrate the shared success of India-UK Research and Innovation partnership

Dr Kavita Gulati

- **Fellow,** International Academy of Cardiovascular Sciences (FIACS), Winnipeg, Canada
- **Treasurer,** Society for Nitric Oxide and Allied Radicals (SNOAR)
- **Member,** IEAC of Dr B.R. Ambedkar Center for Biomedical Research (ACBR)
- **Member,** IEAC of PGIMER, RML Hospital

Dr Ritu Kulshrestha

- **Editor,** *VPCI Newsletter*
- **DST Nominee,** Facility Management Committee, Sophisticated Analytical Instrument Facility (SAIF), AIIMS, New Delhi

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

- **Chairperson,** Institutional Ethics Committee, School of Biosciences, Institute of Management studies (IMS), Ghaziabad.
- **External Expert,** Seventh and Eighth Executive Board Review Meetings of XII Five year plan project, Defence Institute of Physiology & Allied Sciences, DRDO, Ministry of Defence, Government of India

Dr Lovika Lakhtakia [MD Student]

- **Received First Prize,** for oral presentation on "Spectrum of pulmonary aspergillosis in treated patients of pulmonary tuberculosis"; at 20th Joint National Conference of the National College of Chest Physicians (NCCP) and Indian Chest Society (ICS) NAPCON – 2018, Ahmedabad, Gujarat, November 29-December 2, 2018

Dr Neha Koushik [MD Student]

- **Received First Prize,** in NCCP Quiz, on January 21, 2018, New Delhi
- **Received Third Prize,** in a Quiz at PULMOCON-2018

Sponsored Research Projects

S. No.	Faculty Member (Department)	Title of Project	Funding Agency, Date of Sanction/ Implementation and Duration	Grants Received (in ₹)
1.	Prof. S.K. Bansal, Nodal Officer (Biochemistry)	Multidisciplinary Research Unit	DHR, MoHFW January 01, 2014 (Five years)	359.23 Lakhs
2.	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)	24.04 Lakhs
3.	Dr Mandira Varma-Basil (Microbiology)	Phenotypic and genotypic indicators of drug resistant tuberculosis: can these be used as early warning system for MDR- and XDR-tuberculosis?	ICMR March 31, 2015 (Three years) [extended upto 30.09.2018]	62.34 Lakhs
4.	Dr 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
5.	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]	23.04 Lakhs
6.	Dr Madhu Khanna (Respiratory Virology)	Aptamer-mRNA Chimera – the next generation RNA vaccine	DST - SERB August 19, 2016 (Three years)	28.31 Lakhs
7.	Dr Ritu Kulshrestha (Pathology)	Study of the transcriptional mechanisms underlying pulmonary fibrosis and their modulation by therapeutic agents	DST May 21, 2015 (Three years) [extended upto 20.11.2018]	43.00 Lakhs
8.	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) [extended upto 23.11.2018]	20.37 Lakhs
9.	Dr Anita Kotwani (Pharmacology)	Smart regulation for antibiotic use in India: understanding, innovating and improving compliance	DBT September 6, 2018 (Three years)	21.47 Lakhs

S. No.	Faculty Member (Department)	Title of Project	Funding Agency, Date of Sanction/ Implementation and Duration	Grants Received (in ₹)
10.	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
11.	Dr Kavita Gulati (Pharmacology)	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 June 30, 2017 (Three years)	23.57 Lakh
12.	Dr Kavita Gulati (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)	AYUSH March 26, 2018 (Three years)	18.12 Lakhs
13.	Dr Kavita Gulati (Pharmacology)	Experimental studies to evaluate the mode of action of traditional herbal agents in bronchial asthma	NIF July 24, 2017 (One year) [extended upto 30.11.2018]	18.55 Lakhs
14.	Dr Kavita Gulati (Pharmacology)	Experimental pharmacological studies for optimization of constituents of UNIM-352, a polyherbal preparation, for efficacious and safe treatment of bronchial asthma	ICMR March 18, 2016 (Three years)	14.00 Lakhs
15.	Dr Vishal Bansal (Physiology)	Development of exercise protocol to improve hypoxic tolerance	DIPAS April 10, 2015 (Three years) [extended upto 08.09.2018]	50.00 Lakhs
16.	Dr Vishal Bansal (Physiology)	Cognitive performance after short duration sub-maximal exercise in young adults	LSRB, DRDO June 27, 2018 (Three years)	11.62 Lakhs
17.	Prof. Raj Kumar (Pulmonary Medicine)	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
18.	Prof. Raj Kumar (Pulmonary Medicine)	National Tobacco Quit Line Services	Ministry of Health & Family Welfare (Govt. of India) – QL March 12, 2015 (Three years)	382.41 Lakhs

S. No.	Faculty Member (Department)	Title of Project	Funding Agency, Date of Sanction/ Implementation and Duration	Grants Received (in ₹)
19.	Prof. Raj Kumar (Pulmonary Medicine)	Effect of outdoor air pollution on acute respiratory symptoms in Delhi: A multisite project	ICMR March 15, 2017 (One year and three months)	43.43 Lakhs
20.	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 (Department) and Name of Supervisor	Title of Fellowship	Funding Agency, Date of Sanction/ Implementation and Duration	Grants Received (in ₹)
1.	Mr Anil Meena Junior Research Fellow (Biochemistry) *(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)	20.22 Lakhs
2.	Mr Manoj Kumar *Senior Research Fellow* (Biochemistry) *(Supervisor: Prof. S.K. Bansal)*	Characterization of proteins differentially expressed erythrocyte membrane in bronchial asthma: identification and purification of one protein and its correlation with severity of the disease	ICMR September 5, 2018 (Two years)	1.78 Lakhs
3.	Ms Jaishree Garhyan *Post-doctoral Fellow* (Microbiology) *(Supervisor: Dr Mandira Varma-Basil*	Targetting dormant *Mycobacterium tuberculosis* through novel bonehoming liposomes	DST-SERB March 31, 2017 to June 08, 2018	12.03 Lakhs
4.	Mr Kamal Shrivastava *Senior Research Fellow* (Microbiology) *(Supervisor: Dr Mandira Varma-Basil*	Evaluation of an array of PE-PPE genes for potential use in diagnostic assay to identify *Mycobacterium tuberculosis*	ICMR April 13, 2018 (Three years)	4.57 Lakhs
5.	Mr Ashutosh Singh, *Junior Research Fellow* (Medical Mycology) *(Supervisor: Dr Anuradha Chowdhary)*	Molecular epidemiology and ecology of humar pathogenic fungi	CSIR October 20, 2014 (Two years) [extended upto 31.10.2018]	7.41 Lakh
6.	Mr Pradeep Kr Singh *Junior Research Fellow* (Medical Mycology) *(Supervisor: Dr Anuradha Chowdhary)*	Molecular characterization and anti-fungal 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

S. No.	Name of the Fellow (Department) and Name of Supervisor	Title of Fellowship	Funding Agency, Date of Sanction/ Implementation and Duration	Grants Received (in ₹)
7.	Ms Tanushri Nandi *Senior Research Fellow* (Respiratory Virology) *(Supervisor: Dr Madhu Khanna)*	Synergistic effect of host defensive immune peptides in regulation of influenza A virus replication	ICMR August 12, 2015 (Three years+ extended for one year)	16.37 Lakhs
8.	Mr Maaz Naqvi *Junior Research Fellow* (Pharmacology) *(Supervisor: Prof. A Ray)*	Experimental pharmacological studies for optimization of constituents of UNIM-352, a polyherbal preparation for efficacious and safe treatment of bronchial asthma	ICMR March 18, 2016 (Three years)	13.34 Lakhs
9.	Mr Pankaj Verma *Junior Research Fellow* (Pharmacology) *(Supervisor: Dr Kavita Gulati)*	Pharmacological studies to evaluate the anti-inflammatory and immunomodulatory effects of *Hibiscus rosa-sinensis* and *Piper nigrumand* their cellular and molecular mechanism of action in experimental models of bronchial asthma	ICMR January 14, 2019 (Three years)	2.18 Lakhs
10.	Ms Priti Yadav *Senior Research Fellow* (Physiology) *(Supervisor: Dr Vishal Bansal)*	Therapeutic potential of heat pre-conditioning on chronic inflammation and infection in rats	ICMR January 30, 2019 (Three years)	5.78 Lakhs
11.	Mr Kamal Singh *Senior Research Fellow* (Pulmonnary Medicine) *(Supervisor: Prof. Raj Kumar)*	Analysis of inflammatory biomarkers in asthmatic children affected with indoor air pollution in Delhi-NCR	ICMR July 20, 2018 (Three years)	4.57 lakhs
12.	Mr Anil Kumar Mavi *Senior Research Fellow* (Pulmonnary Medicine) *(Supervisor: Prof. Raj Kumar)*	Biochemical and immunological studies of pigeons allergens in `	ICMR July 20, 2018 (Three years)	4.57 lakhs

Conferences/Symposia/Seminars/Workshops/CMEs

S. No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
1.	Prof. S.K. Bansal	Lecture on Ethics in biomedical research involving human participants	Department of Microbiology, VPCI and Indian Association of Medical Microbiology (Delhi Chapter)	CME on Mapping the Footprints of NTM Infection: The Neglected Mycobacterial Disease Delhi November 1, 2018
2.	Prof. S.K. Bansal	Participated	Dr B.R. Ambedkar Centre for Biomedical Research (ACBR), University of Delhi	9th Workshop on Bioinformatics and Molecular Modelling in Drug Design Delhi March 25-27, 2019
3.	Prof. Raj Kumar	Penalist in Discussion on How effective are quitline services in SEAR to promote tobacco cessation Delivered talk and give a brief introduction about the National Tobacco Quitline Services (NTQLS)	Ministry of Health and Family Welfare, Govt. of India and WHO	Regional Workshop for Capacity Building in Tobacco Cessation in SEAR, WHO FCTC New Delhi April 23-24, 2018
4.	Prof. Raj Kumar	Guest lecture on Current issues in diagnosis and treatment of sarcoidosis	Chest Care and Research Society, Era's Lucknow Medical College and Hospital, Lucknow and UP Tuberculosis Association	National CME on ILD Lucknow May 19, 2018
5.	Prof. Raj Kumar	Lecture on Expansion of National Tobacco Quitline	Ministry of Health and Family Welfare, Govt. of India and WHO	World No Tobacco Day New Delhi June 6-7, 2018
6.	Prof. Raj Kumar	Chairman, Organizing Committee Faculty lectures on • Allergy diagosis: *in-vivo* • Mites and its allergens: its concentration and clinical relevance • Key factors to be considered before initiation of AIT AND management of polysensitized patients • Setting-up an Allergy Clinic Hands on Practical Training – SPT	VPCI	43rd Workshop on Respiratory Allergy: Diagnosis and Management Delhi June 18-22, 2018

S. No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
7.	Prof. Raj Kumar	Chairperson	Metro Hospital	PACS INDIA-2018 Noida (Uttar Pradesh) August 18, 2018
8.	Prof. Raj Kumar	Participated	VPCI and European Society of Clinical Microbiology and Infectious Diseases (ESCMID)	Postgraduate Education Course– Antifungal Resistance in *Candida* and *Aspergillus:* from Clinic to Clinical Laboratory Delhi September 19-21, 2018
9.	Prof. Raj Kumar	Chairperson, Organising Committee	VPCI	CME on Mapping the Footprints of NTM Infection: The Neglected Mycobacterial Disease Delhi November 1, 2018
10.	Prof. Raj Kumar	Guest lecture on Smoking cessatin – need of the hour	Jaipur Golden Hospital	RESPICON INDIA 2018 New Delhi November 2, 2018
11.	Prof. Raj Kumar	Guest lecture on Lung health	International Union Against Tuberculosis and Lung Disease (The Union)	Pre-Conference Meet for 50th Union World Conference on Lung Health New Delhi November 21, 2018
12.	Prof. Raj Kumar	Guest lectures on • Use of smartphone apps for smoking cessation • Food allergy: an overview • Prevention/prescreption to set allergy clinic Chairperson in Symposium on Allergy and aerobiology	Gujrat University, National College of Chest Physicians (NCCP) and Indian Chest Society (ICS)	20th Joint National Conference of the National College of Chest Physicians (NCCP) and Indian Chest Society (ICS) NAPCON – 2018 Ahmedabad (Gujarat) November 29 –December 2, 2018
13.	Prof. Raj Kumar	Guest lecture on Smoking and lung health	VPCI and Society for Tobacco Control	Public Awareness Programme Delhi December 6, 2018
14.	Prof. Raj Kumar	Guest lecture on Environmental pollution and human health hazards Chairperson	JNU	International Conference on Global Environmental Challenges Human Health and Sustainable Development New Delhi January 13, 2019
15.	Prof. Raj Kumar	Chairperson	VPCI	Workshop to Develop Capacity of Pharmacists for Optimal Use of Antibiotics Delhi February 28, 2019

S. No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
16.	Prof. Raj Kumar	Panelist in Workshop I on Clinical cases discussion Guest lectures on • Allergy diagnosis: an algorithmic approach • Managing AIT patients in clinical practice Moderator Consensus Discussion on Implementing AIT protocol for aeroallergens	VPCI	1st Update on Allergen Immunotherapy Delhi March 5, 2019
17.	Dr Malini Shariff	Participated	VPCI	CME on Mapping the Footprints of NTM Infection: The Neglected Mycobacterial Disease Delhi November 1, 2018
18.	Dr Malini Shariff	Paticipated	Indian Association of Medical Microbiologists (Delhi Chapter)	CME on Reliable Antimicrobial Sensitivity Testing in Era of AMR New Delhi November 2, 2018
19.	Dr Malini Shariff	Lecture on Clinical microbiology update: challenges and solutions	Indian Association of Medical Microbiologists (Delhi Chapter)	10th Annual Conference of Indian Association of Medical Microbiologists (Delhi Chapter) New Delhi November 3, 2018
20.	Dr Mandira Varma-Basil	Invited speaker Efflux pumps: how important are they for drug resistance in *MTB*	PGI, Chandigarh	TB CME Chandigarh April 06, 2018
21.	Dr Mandira Varma-Basil	Invited speaker Role of efflux pumps in drug resistance in *M. tuberculosis*	Antibiotics 2018 Meeting International	World Congress on Antibiotics Rome, Italy August 13-14 2018
22.	Dr Mandira Varma-Basil	Speaker Unmet needs and challenges: NTM disease	VPCI and IAMM (Delhi Chapter)	CME on Mapping the Footprints of NTM Infection: The Neglected Mycobacterial Disease Delhi November 1, 2018
23.	Dr Anuradha Chowdhary	Guest lecture on Identification and antifungal susceptibility of *Candida auris*	International Society for Human and Animal Mycology (ISHAM)	20th Congress of the International Society for Human and Animal Mycology Amsterdam, the Netherlands June 30- July 4, 2018

S. No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
24.	Dr Anuradha Chowdhary	Lecture on Fungal human pathogens: from obscure significance to impending disasters	International Mycological Association (IMA)	11th International Mycological Congress San Juan, Puerto Rico July 16-21, 2018
25.	Dr Anuradha Chowdhary	Guest lecture on Changing epidemiology of nosocomial fungal infections	Hong Kong Society for Microbiology and Infection	17th Asia Pacific Congress of Clinical Microbiology and Infection-cum-8th International Infection Control Conference Hong Kong August 30 –September 2, 2018
26.	Dr Anuradha Chowdhary	Guest lecture on New insights in epidemiology of *Aspergillus fumigatus*	International Society of Human and Animal Mycology (ISHAM)	Continued Antifungal Research and Education Vienna, Austria October 27-28, 2018
27.	Dr Anuradha Chowdhary	Guest lecture on Natural disasters and mycosis	International Society of Human and Animal Mycology (ISHAM)	3rd ISHAM Forum on Fungal Infections in the Middle East Dubai, UAE November 23-24, 2018
28.	Dr Anuradha Chowdhary	Plenary lecture on The emerging problem of untreatable severe superficial dermatophytosis due to emerging resistance in India	International Society of Human and Animal Mycology (ISHAM) and European Confederation of Medical Mycology (ECMM) and British Mycological Society (BMS)	14th Annual Fungal Update Westminster, London March 15-16, 2019
29.	Dr Madhu Khanna	Speaker Influenza vaccination in elderly individuals	Scientific Federation, Spain	3rd Global Virology Congress & Expo Valencia, Spain December 6-7, 2018
30.	Dr Anita Kotwani	Speaker on Engaging with private providers in low and middle income countries: strengthening quality of care and effective regulations	Health Systems Research	Fifth Global Symposium on Health Systems Research Liverpool, UK October 8-12, 2018
31.	Dr Anita Kotwani	Participated	Department of Pharmacology, PGI, Chandigarh	Monthly Meet on Antimicrobial Stewardship Program Activities Chandigarh November 15-16, 2018
32.	Dr Anita Kotwani	Speaker on Need for smart regulations in antibiotic use	Christian Medical College, Vellore	Quality Circle Meeting Vellore December 8, 2018

S. No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
33.	Dr Anita Kotwani	Speaker on Antimicrobial resistance and smart regulation of antibiotic use	Commonwealth Veterinary Association	70th IPC Conference Noida December 21, 2018
34.	Dr Anita Kotwani	Oragniser	WHO	Workshop to Develop Capacity of Pharmacists for Optimal Use of Antibiotics Delhi February 28, 2019
35.	Dr Anita Kotwani	Lecture on Smart regulation of antibiotic use in India: one health approach	Indian Pharmaceutical Congress	7th Pan Commonwealth Veterinary Conference Bangalore March 3-7, 2019
36.	Dr Kavita Gulati	Panelist	All India Institute of Medical Sciences, New Delhi	Symposium on Shaping Pharmacovigilance in India New Delhi April 15, 2018
37.	Dr Kavita Gulati	Participated	CCRUM and AYUSH	Research Methodology Workshop Delhi June 27, 2018
38.	Dr Kavita Gulati	Invited talk on Role of immune system during stress-induced gastric ulcerogenesis: strategies for gastric cytoprotection	ISCTICO and IUPHAR-GI	GI-Symposium Kyoto, Japan June 28-30, 2018
39.	Dr Kavita Gulati	Invited talk on Pharmacovigilance: basic concepts and application	Hamdard Institute of Medical Science and Research, Jamia Hamdard	Hamdard Institute of Medical Science and Research New Delhi August 14, 2018
40.	Dr Kavita Gulati	Guest Lecture on Assessment of ADRs: clinical relevance and management	Indian Pharmacopoeia Commission and 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: Optimising Medicine Safety is Our Goal Ghaziabad (Uttar Pradesh) November 12, 2018
41.	Dr Kavita Gulati	Invited talk on Yogic intervention in the management of bronchial asthma	Delhi Pharmacological Society and AIIMS	Symposium on Recent Trends in Pharmacology Research New Delhi December 18, 2018

S. No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
42.	Dr Kavita Gulati	Chairperson in a scientific session on Theophylline induced cardiotoxicity and its mechanisms: a translational approach	IACS-INDIA	International Conference on Translational Research in Cardiovascular Sciences Bengaluru February 15-17, 2019
43.	Dr Vishwajeet Rohil	Guest of Honour	Institute of Management Studies (IMS) University, Ghaziabad	National Conference on Emerging Trends in Non-Communicable Diseases: Road to Prevention and Cure Ghaziabad November 17, 2018
44.	Dr Vishwajeet Rohil	Participated	VPCI, Delhi	Workshop to Develop Capacity of Pharmacists for Optimal Use of Antibiotics Delhi February 28, 2019
45.	Dr Ritu Kulshrestha	Resource person on Potpourri of interesting cases and diagnostic traps in broncho-pulmonary cytology	Division of Cytopathology, National Institute of Cancer Prevention & Research	CME on Gray Zones and Recent Updates in Breast, Thyroid, Bronchopulmonary and Cervical Cytology Noida (Uttar Pradesh) June 4-5, 2018
46.	Dr Ritu Kulshrestha	Resource person on Interesting cases of molecular diagnosis of lung cancer	Department of Pathology, Subharti Medical College, Swami Vivekanand Subharti University	6th Annual Conference of UP Chapter of Indian Academy of Cytologists (UP CYTOCON 2018) Meerut (Uttar Pradesh) September 22-23, 2018
47.	Dr Ritu Kulshrestha	Resource person on Pathologists on panel for break-out practical workshop: clinical cases	Bombay Hospital and Medical Research Centre	Diffuse Lung Disease – Update 2018 New Delhi September 30, 2018
48.	Dr Ritu Kulshrestha	Presented paper on Designing of polymeric nano-particle drug delivery systems for the treatment of lung fibrosis	AIIMS New Delhi, IIT Delhi and DBT	3rd Annual Conference of Indian Society of Nanomedicine New Delhi October 25-27, 2018
49.	Dr Ritu Kulshrestha	Resource person on Interpreting pathology in ILD: what every physician should know Pannelist in the MDD Session	National College of Chest Physicians (India)	20th National Conference on Pulmonary Disease (NAPCON) 2018 Workshop on Interstitial Lung Disease Ahmedabad, Gujarat November 29, 2018

S. No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
50.	Dr Vishal Bansal	Judge (Poster competition)	Department of Physiology, Maulana Azad Medical College, New Delhi	Delving into the Stress Response HPA-Axis, Nutrition and Exercise Delhi November 15, 2018
51.	Dr Vishal Bansal	Invited Faculty	Department of Medicine, Maulana Azad Medical College, New Delhi	Medicine Update 2019 Delhi March 9-10, 2019
52.	Mr Manoj Kumar Mr Anil Meena *(Supervisor: Prof. S.K. Bansal)*	Participated	Dr B.R. Ambedkar Centre for Biomedical Research (ACBR), University of Delhi	9th Workshop on Bioinformatics and Molecular Modelling in Drug Design Delhi March 25-27, 2019
53.	Dr Lovika Lakhtakia *(MD Student)* *(Supervisor: Prof. Raj Kumar)*	Oral presentation on Spectrum of pulmonary aspergillosis in treated patients of pulmonary tuberculosis	Gujarat University, National College of Chest Physicians (NCCP) and Indian Chest Society (ICS)	20th Joint national Conference of the National College of Chest Physicians (NCCP) and Indian Chest Society (ICS) NAPCON – 2018 Ahmedabad, Gujarat November 29-December 2, 2018
54.	Ms Neha Kaushik *(MD Student)* *(Supervisor: Prof. Raj Kumar)*	Presented poster on Prevalence of anxiety and depression as well as its impact on quality of life in patients with interstitial lung disease	Asian Public Society of Respirology	23rd Congress of the Asian Public Society of Respirology Taipei, Taiwan November 29-December 2, 2018
55.	Mr Anil Kumar Mavi *(Supervisor: Prof. Raj Kumar)*	Presented posters on • Atmospheric pollen count level and its impact on respiratory health in Delhi-NCR • Relationship of specific IgE,Total IgE and skin test sensitivity to pigeon allergens in asthma patients	Gujarat University, National College of Chest Physicians (NCCP) and Indian Chest Society (ICS)	20th Joint national Conference of the National College of Chest Physicians (NCCP) and Indian Chest Society (ICS) NAPCON – 2018 Ahmedabad, Gujarat November 29-December 2, 2018
56.	Mr Anil Kumar Mavi *(Supervisor: Prof. Raj Kumar)*	Oral presentation on Immunological analysis of pigeon allergens in asthma patients exposed to pigeons: a case and control study	World Allergy Organisation	WAO International Conference Florence, Itally December 6-9, 2018

S. No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
57.	Mr Kamal Singh *(Supervisor: Prof. Raj Kumar)*	Presented posters on • Prevalence of COPD in adults and associated risk factors in rural regions of Delhi • Household air pollution and its effects on the respiratory health of children in Delhi-NCR • Effect of indoor particulate matter on C-reactive protein for systemic inflammation in asthmatic children	Gujarat University, National College of Chest Physicians (NCCP) and Indian Chest Society (ICS)	20th Joint national Conference of the National College of Chest Physicians (NCCP) and Indian Chest Society (ICS) NAPCON – 2018 Ahmedabad, Gujarat November29- December 2, 2018
58.	Dr Naveen Vennilavan R *(MD Student)* *(Supervisor: Prof. Raj Kumar)*	Presented poster on Lung carcinoma masquerading as amoebic lung abscess	Gujarat University, National College of Chest Physicians (NCCP) and Indian Chest Society (ICS)	20th Joint national Conference of the National College of Chest Physicians (NCCP) and Indian Chest Society (ICS) NAPCON – 2018 Ahmedabad, Gujarat November 29-December 2, 2018
59.	Mr Chanchal Kumar *(Supervisor: Mandira Varma-Basil)*	Presented poster on An in-house duplex PCR assay used for identification of *Mycobacterium tuberculosis* as an abutment of MGIT TBc ID test	European Society of Mycobacteriologists	39th Annual Congress of ESM Dresden, Germany July 1- 4, 2018
60.	Mr Chanchal Kumar *(Supervisor: Mandira Varma-Basil)*	Presented poster on A comparison of phenotypic method of drug susceptibility profiling of *Mycobacterium tuberculosis* with sloppy molecular beacon assay	Lady Hardinge Medical College	1ST Quarterly Meet of Indian Association of Medical Microbiologist (Delhi Chapter) New Delhi April 21, 2019
61.	Mr Kamal Shrivastava *(Supervisor: Mandira Varma-Basil)*	Participated	Lady Hardinge Medical College	1ST Quarterly Meet of Indian Association of Medical Microbiologist (Delhi Chapter) New Delhi April 21, 2019
62.	Mr Ashutosh Singh *(Supervisor: Dr Anuradha Chowdhary)*	Lecture on Emergence of clinical and mycological resistance in trichophyton interdigitale infections in North India Presented a poster on Fluconazole resistance in *Candida parapsilosis* in India and analysis of sterol biosynthesis gene (ERG11)	International Society for Human and Animal Mycology (ISHAM)	20th Congress of the International Society for Human and Animal Mycology (ISHAM) RAI Amsterdam, the Netherlands June 30-July 04, 2018

S. No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
63.	Mr Pradeep Kumar (*Supervisor: Dr Anuradha Chowdhary)*	Presented posters on • *In vitro* activity of the new antifungal drugs olorofim (F901318) and topical azoles, luliconazole and sertaconazole, against molecularly characterized clinical penicillium and talaromyces isolates • Evaluation of species diversity among Indian clinical schizophyllum commune using matrix-assisted laser desorption ionization–time of flight mass spectrometry and MLST	International Society for Human and Animal Mycology (ISHAM)	20th Congress of the International Society for Human and Animal Mycology (ISHAM) RAI Amsterdam, the Netherlands June 30 – July 04, 2018
64.	Ms Cheshta Sharma *(Supervisor: Dr Anuradha Chowdhary)*	Lecture on Genomic perspective of triazole resistance in *Aspergillus fumigatus* isolates without cyp51A mutations using whole-genome sequencing	International Society for Human and Animal Mycology (ISHAM)	20th Congress of the International Society for Human and Animal Mycology (ISHAM) RAI Amsterdam, the Netherlands June 30 – July 04, 2018
65.	Dr Nishant Rai *(Supervisor: Dr Kavita Gulati)*	Presented a paper on Experimental studies to evaluate the cellular and molecular mechanisms of a traditional polyherbal anti-asthmatic preparation UNIM-352 in rats: a reverse pharmacology approach	ISCTICO and International Union of Basic and Clinical Pharmacology (IUPHAR)	18th World Congress of Basic and Clinical Pharmacology (WCP 2018) Kyoto, Japan July 1-6, 2018
66.	Ms Apoorva Pandey *(Supervisor: Dr Ritu Kulshrestha)*	Presented paper on Bosentan therapy modulates miR-21-TGF-β1-bFGF-Let-7d axis and attenuates the development of pulmonary artery hypertension after bleomycin injury	Dutch Society of Immunology and European Federation of Immunological Societies	5th European Congress of Immunology Amsterdam, the Netherlands, September 2 – 5, 2018
67.	Dr Uma Tyagi	Participated	B.B. Dikshit Library, All India Institute of Medical Sciences (AIIMS)	National Seminar on Access and Availabilty of Medical Literature in Electronic Environment New Delhi April 17, 2018
68.	Dr Uma Tyagi	Presented paper on Innovative solutions of ICT services to medical professionals: holistic empowerment by public libraries in India	National Medical Library	National Conference on ERMED: Digital Health India: A Reality New Delhi May 3-4 2018

S. No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
69.	Dr Uma Tyagi	Presented paper on Evolving dynamics of LIS professionals: career prospects and utility of LIS education in ICT era	Professor G Ram Reddy Library, IGNOU in association with IASLIC	IASLIC-IGNOU Librarians' Day on Library Professional at the Crossroads New Delhi September 17, 2018
70.	Dr Uma Tyagi	Resource person Lecture on GFR for school libraries and its application in digital era' and librarians and 'problems in school libraries	State Council of Educational Research and Training (SCERT)	In-Service Programme for Librarians New Delhi January 30 - 31, 2019 and February 5, 2019

Participation in Advanced and Specialised Training Programme by Faculty Members

S. No.	Participant (Department)	Course Title/ Topic	Training Duration	Host
1.	Dr Kavita Gulati (Pharmacology)	AMC Coordinator Meet-cum-Advanced Training Program for Patient Safety Pharmacovigilance Associates (PsPvAs)	December 1, 2018	ADR Monitoring Centres (AMCs) of North Region, PGIMER, Chandigarh
2.	Dr Kavita Gulati (Pharmacology)	Pharmacovigilance Program for Ayurveda, Siddha, Unani and Homoepathy Drugs / Basic introduction and concept of ASU-H Pharmacovig	March 19-20, 2019	Indian Pharmacopoeia Commission (IPC), Ghaziabad (Uttar Pradesh)
3.	Dr Ritu Kulshrestha (Pathology)	PD-L1 (SP263) Pathologist Training Workshop for NSCLC	October 15, 2018	Roche Diagnostics India Pvt. Ltd, Delhi
4.	Dr Uma Tyagi (Library)	Library Automation and Networking	November 26 - December 7, 2018	CSIR-National Institute of Science Communication and Information Resources (CSIR-NISCAIR), Information and Human Resources Division, Education and Training, 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.	Mr Sudhanshu Sharma MSc (Biochemistry) Galgotia University, Greater Noida (Uttar Pradesh)	Techniques in biochemistry	Prof. S.K. Bansal (Biochemistry)	June 1 – July 13, 2018
2.	Ms Avjeet Kaur Ms Pooja Bansal M.Sc (Biotechnology) Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Haryana)	Techniques in biochemistry	Prof. S.K. Bansal (Biochemistry)	June 1 – July 13, 2018
3.	Ms Nisha Kaushik M.Sc (Biotechnology) Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Haryana)	Techniques in biochemistry	Prof. S.K. Bansal (Biochemistry)	June 14 – July 13, 2018
4.	Ms Santripta Bhowmik BSc (Hons) (Biotechnology) Amity Institute of Biotechnology, Amity University Noida (Uttar Pradesh)	Clinical biochemistry/ biotechnology	Dr Vishwajeet Rohil (Clinical Biochemistry)	May 15 – June 6, 2018
5.	Ms Vani Shree BTech (Biotechnology) Jaypee Institute of Information Technology, Noida (UP)	Clinical biochemistry/ biotechnology	Dr Vishwajeet Rohil (Clinical Biochemistry)	June 1 – July 16, 2018
6.	Ms Sanyogita Rai Ms Gunjan MSc (Biotechnology) Institute of Applied Medicines and Research, Ghaziabad (UP)	Clinical biochemistry/ biotechnology	Dr Vishwajeet Rohil (Clinical Biochemistry)	June 1 – July 31, 2018
7.	Ms Parul Khatri Ms Richi Kushwaha MSc (Biotechnology) Deenbandhu Chhotu Ram University of Science and Technology, Murthal (Haryana)	Clinical biochemistry/ biotechnology	Dr Vishwajeet Rohil (Clinical Biochemistry)	June 1 – August 31, 2018
8.	Ms Varsha Chauhan MSc (Biotechnology) Amity Institute of Microbial Biotechnology, Amity University Noida (Uttar Pradesh)	Real-time PCR for rapid identification and differentiation of *Mycobacterium tuberculosis* complex from non-tuberculous mycobacteria	Dr Mandira Varma-Basil (Microbiology)	December 2017– April, 2018

S. No.	Name, Subject and University/Institute/College	Course Title/ Topic	Faculty Member (Department)	Period
9.	Ms Sakshi Anand MSc (Biomedical Sciences) Dr B.R. Ambedkar Center for Biomedical Research, University of Delhi, Delhi	A study on the occurrence of non-tuberculous mycobacteria in the environment and as normal flora of humans	Dr Mandira Varma-Basil (Microbiology)	December 2018– April, 2019
10.	Mr Vishwajeet Barik MSc (Biomedical Sciences) Dr B.R. Ambedkar Center for Biomedical Research, University of Delhi, Delhi	A study of phenotypic and genotypic resistance to Bedaquiline in naïve clinical isolates of *Mycobacterium tuberculosis*	Dr Mandira Varma-Basil (Microbiology)	December 2018– April, 2019
11.	Mr Sudhanshu Sharma MSc (Biochemistry) Galgotia University, Noida (Uttar Pradesh)	A study of resistance to Bedaquiline in clinical isolates of *M. tuberculosis* in Delhi	Dr Mandira Varma-Basil (Microbiology)	January 2019 – June 2019
12.	Mr Surya Pratap Singh M Tech Gautam Budh University, Noida (Uttar Pradesh)	Identification and genotyping of *M. kansassii* isolates by MALDI-TOF	Dr Mandira Varma-Basil (Microbiology)	January 2019 – June 2019
13.	Ms Sandhya MSc (Applied Microbiology) Chaudhary Charan Singh University, Meerut (Uttar Pradesh)	Genotyping of *M. kansassii* isolates by PCR-RFLP	Dr Mandira Varma-Basil (Microbiology)	January 2019 – June 2019
14.	30 Students	Antifungal resistance in *Candida* and *Aspergillus:* from clinic to clinical laboratory	Dr Anuradha Chowdhary (Microbiology)	September 19-21, 2018
15.	Ms Nipanshi Tyagi Ms Soumya Sharma Ms Aayush Bahl (MSc Biotechnology) Amity University Noida (Uttar Pradesh)	Training on pathology techniques	Dr Ritu Kulshrestha (Pathology)	January 1 – April 07, 2019
16.	Ms Neha Ms Anjali Jain Ms Rashmi (MSc Biotechnology) Institute of Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Haryana)	Training on pathology techniques	Dr Ritu Kulshrestha (Pathology)	June 01 – July 31, 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, a public awareness programme on Smoking and Health"was held on December 6, 2018.

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)

List of Publications

Journals

1. Aditi, Shariff Malini. Nipah virus infection: a review. *Epidemiol Infect* 2019;147:1–6.

2. Arendrup MC, Chowdhary A, Astvad KMT, Jørgensen KM. APX001A *in vitro* activity against contemporary blood isolates and *Candida auris* determined by the EUCAST reference method. *Antimicrob Agents Chemother* 2018;62:e01225–18.

3. Babita, Gulati K, Ray A, Menon BK, Kumar Raj. A clinical study to evaluate the effects of adjunct yogic intervention on pulmonary functions in patients of bronchial asthma. *J Clin Investi Studies* 2018;1:1–4.

4. Beri Kiran, Jayanthi G, Shariff Malini. Phenotypic and molecular characterization of extended-spectrum beta-lactamase producing clinical isolates of *Klebsiella pneumoniae. Int J Sci Res* 2018;7:63–65

5. Bidaud AL, Chowdhary A, Dannaoui E. *Candida auris:* an emerging drug resistant yeast: a mini-revie*w. J Mycol Med* 2018;28:568–73.

6. Buil JB, Hagen F, Chowdhary A, Verweij PE, Meis JF. Itraconazole, voriconazole, and posaconazole CLSI MIC distributions for wild-type and azole-resistant *Aspergillus fumigatus* isolates. *J Fungi (Basel)* 2018;4:E103.

7. Chaudhary S, Gulati K, Rai N, Ray A. Anti-inflammatory and immunomodulatory effects of *Albizia lebbeck* in experimental model of bronchial asthma. *Indian J Chest Dis Allied Sci* 2018;60:147–52.

8. Chowdhary A, Prakash A, Sharma C, Kordalewska M, Kumar A, Sarma S, Tarai B, Singh A, Upadhyaya G, Upadhyay S, Yadav P, Singh PK, Khillan V, Sachdeva N, Perlin DS, Meis JF. A multicentre study of antifungal susceptibility patterns among 350 *Candida auris* isolates (2009-17) in India: role of the ERG11 and FKS1 genes in azole and echinocandin resistance. *J Antimicrob Chemother* 2018;73:891–9.

9. Chowdhary A, Singh A, Singh PK, Khurana A, Meis JF. Perspectives on misidentification of trichophyton interdigitale/trichophyton mentagrophytes using internal transcribed spacer region sequencing: urgent need to update the sequence database. *Mycoses* 2019;62:11–15.

10. Colley T, Sehra G, Chowdhary A, Alanio A, Kelly SL, Kizawa Y, Armstrong-James D, Fisher MC, Warrilow AGS, Parker JE, Kelly DE, Kimura G, Nishimoto Y, Sunose M, Onions S, Crepin D, Lagasse F, Crittall M, Shannon J, McConville M, King-Underwood J, Naylor A, Bretagne S, Murray J, Ito K, Strong P, Rapeport G. *In vitro* and *in vivo* efficacy of a novel and long-acting fungicidal azole, PC1244, on *Aspergillus fumigatus* infection. *Antimicrob Agents Chemother* 2018;62:e01941–17.

11. Cortegiani A, Misseri G, Fasciana T, Giammanco A, Giarratano A, Chowdhary A. Epidemiology, clinical characteristics, resistance, and treatment of infections by *Candida auris. J Intensive Care* 2018;6:69.

12. Deepak D, Singh Rajput M, Sharma B, Chowdhary A. Allergic bronchopulmonary mycosis due to fungi other than *Aspergillus. Eur Ann Allergy Clin Immunol* 2019;51:75–79.

13. de Groot T, Hagen F, Vreuls W, Verweij PE, Chowdhary A, Meis JF. Genotyping of *Aspergillus fumigatus* in formalin-fixed paraffin-embedded tissues and serum samples from patients with invasive aspergillosis. *Front Cell Infect Microbiol* 2018;8:377.

14. Dogra Vikas, Menon Balakrishnan, Bansal Vishal, Gaur SN. Correlation between CT phenotypic patterns with clinical, nutritional and pulmonary function parameters among COPD patients. *Int J Res Med Sci* 2018;6: 1770–7.

15. Dogra Vikas, Menon Balakrishnan, Bansal Vishal, Gaur SN. To assess the correlates of respiratory morbidity related quality of life, using St George Respiratory Questionnaire (SGRQ) among male COPD patients. *Int J Adv Med* 2018;5:498–504.

16. 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. *Neuro Toxicolo* 2018;66:58–65.

17. Fakhim H, Vaezi A, Dannaoui E, Chowdhary A, Nasiry D, Faeli L, Meis JF, Badali H. Comparative virulence of *Candida auris* with *Candida haemulonii, Candida glabrata* and *Candida albicans in a murine model. Mycoses* 2018;61:377–82.

18. Fakhim H, Vaezi A, Dannaoui E, Sharma C, Mousavi B, Chowdhary A, Meis JF, Badali H. *In vitro* combination of voriconazole with micafungin against azole-resistant clinical isolates of *Aspergillus fumigatus from different geographical regions. Diagn Microbiol Infect Dis* 2018;91:266–8.

19. Giri Astha, Safi Hassan, Cabibbe Andrea Maurizio, Gupta Shraddha, Narang Anshika, Tyagi Gaurav, Shrivastava Kamal, Kumar Chanchal, Sharma Naresh, Lingaraju Subramanya, Trovato Alberto, Battaglia Simone, Maria Cirillo, Daniela, Bose Mridula, Alland David, Varma Basil Mandira. Lack of association of novel mutation Asp397Gly in aftB gene with ethambutol resistance in clinical isolates of *Mycobacterium tuberculosis. Tuberculosis* 2019;115:49–55.

20. Gulati K, Rai N, Naqvi M, Ray A. Protective role of herbal drugs against stress induced immunosuppression and the possible mechanism. *EC Psychol Psychiatry* 2018;7:370–6.

21. Gulati K, Rai N, Reshi MR, Ray A. Hepatotoxicity: its mechanisms, experimental evaluation and protective strategies. *Am J Pharmacol* 2018;1:1–9.

22. Gupta Smriti, Kumar Ajit, Rohil Vishwajeet, Bhatnagar Anuj K. ADAM33: Role and pathogenesis study in COPD in Delhi NCR Population. *Int J Biol Med Res* 2019;10:6623–30.

23. Healey KR, Kordalewska M, Jiménez Ortigosa C, Singh A, Berrío I, Chowdhary A, Perlin DS. Limited ERG11 mutations identified in isolates of *Candida auris* directly contribute to reduced azole susceptibility. *Antimicrob Agents Chemother* 2018;62: e01427–18.

24. Joon D, Nimesh M, Gupta S, Kumar C, Varma-Basil M, Saluja D. Development and evaluation of rapid and specific sdaA LAMP-LFD assay with Xpert MTB/RIF assay for diagnosis of tuberculosis. *J Microbiol Methods* 2019;159:161-6.

25. Khurana A, Masih A, Chowdhary A, Sardana K, Borker S, Gupta A, Gautam RK, Sharma PK, Jain D. Correlation of *in vitro* susceptibility based on MICs and squalene epoxidase mutations with clinical response to terbinafine in patients with tinea corporis/cruris. *Antimicrob Agents Chemother* 2018;62:e01038–18.

26. Kordalewska M, Lee A, Park S, Berrio I, Chowdhary A, Zhao Y, Perlin DS. Understanding echinocandin resistance in the emerging pathogen *Candida auris. Antimicrob Agents Chemother* 2018;62:e00238–18.

27. 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.

28. Kumar R, Jha AK, Munish VG, Pusp Amal, Sinha P, Gupta Pooja, Kumar M, Saroj SK, Mishra Jyoti, Rachna, Dubey SM, Amrita, Berry Aradhana, Raheja A, Goyer Gunjan, Kadambri, Bhardwaj M, Malik Manisha, Kumar N, Tyagi Prachi, Solanki Pooja, Verma Ritu, Salaria Ruchi, Savitri, Kumar S, Zafar Z. National Tobacco Quitline: The preliminary Indian experience. *Indian J Chest Dis Allied Sci* 2018;60:7–12.

29. Kumar R, Jha AK, Munish VG, Pusp Amal, Sinha P, Gupta Pooja, Kumar M, Saroj SK, Mishra Jyoti, Rachna, Dubey SM, Amrita, Berry Aradhana, Raheja A, Goyer Gunjan, Kadambri, Bhardwaj M, Malik Manisha, Kumar N, Tyagi Prachi, Solanki Pooja, Salaria Ruchi, Savitri, Kumar S, Zafar Z. National Tobacco Quitline – A comparative study of prevalence of smoking and smokeless tobacco use in India: a brief one-year report. *Indian J Chest Dis Allied Sci* 2018;60:221–5.

30. Kumar R, Saroj SK, Kumar M, Mahakud GC. Demographic profile, smoking cessation interventions and continuous abstinence of tobacco users at two years. *Indian J Chest Dis Allied Sci* 2019;61;31–37.

31. Martínez-Murcia A, Navarro A, Bru G, Chowdhary A, Hagen F, Meis JF. Internal validation of GPS™ MONODOSE CanAur dtec-qPCR kit following the UNE/EN ISO/IEC 17025:2005 for detection of the emerging yeast *Candida auris. Mycoses* 2018;61:877–84.

32. Mathur P, Hasan F, Singh PK, Malhotra R, Walia K, Chowdhary A. Five-year profile of candidaemia at an Indian trauma centre: High rates of *Candida auris* blood stream infections. *Mycoses* 2018;61:674–80.

33. Meis JF, Chowdhary A. *Candida auris:* a global fungal public health threat. *Lancet Infect Dis* 2018;18:1298–9.

34. Naqvi M, Rai N, Gulati K, Ray A. Experimental studies to evaluate the immunomodulatory and anti-inflammatory potential of optimized polyherbal preparations in experimental model of asthma. *Glob Vaccines Immunol* 2018;3:1–5.

35. Pal R, Gulati K, Banerjee BD, Ray A. Protective effects of melatonin in endosulfan induced immunomodulation and their association with oxidative stress markers in rats. *Indian J Exp Biol* 2018;56:725–33.

36. Pandey Apoorva, Kulshrestha Ritu, Menon B, Kumar R, 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.

37. Patidar BS, Meena A, Kumar M, Menon BK, Rohil V, Bansal SK. Adenosine metabolism in COPD: A study on adenosine levels, 5′-nucleotidase, adenosine, adenosine deaminase and its isoenzymes activity in serum, lymphocytes and erythrocytes. *COPD* 2018;15:559–71.

38. Poongadan MN, Gupta N, Kumar R. Asthma control test and correlation with spirometry and inflammatory markers in asthma patients at a tertiary care centre in India. *Indian J Chest Dis Allied Sci* 2018;60:239–44.

39. Ramaswamy Swapna, Chhabra SK, Gupta Mansi, Dash Devi Jyoti, Bansal Vishal. Salbutamol but not ipratropium shifts autonomic balance towards sympathetic in chronic obstructive pulmonary disease. *Curr Respir Med Rev* 2018;14:166–71.

40. Resendiz Sharpe A, Lagrou K, Meis JF, Chowdhary A, Lockhart SR, Verweij PE; ISHAM/ECMM Aspergillus Resistance Surveillance working group. Triazole resistance surveillance in *Aspergillus fumigatus. Med Mycol* 2018;56:83–92.

41. Ropars J, Maufrais C, Diogo D, Marcet-Houben M, Perin A, Sertour N, Mosca K, Permal E, Laval G, Bouchier C, Ma L, Schwartz K, Voelz K, May RC, Poulain J, Battail C, Wincker P, Borman AM, Chowdhary A, Fan S, Kim SH, Le Pape P, Romeo O, Shin JH, Gabaldon T, Sherlock G, Bougnoux ME, d'Enfert C. Gene flow contributes to diversification of the major fungal pathogen *Candida albicans. Nat Commun* 2018;9:2253.

42. Shariff Malini, Aditi, Beri Kiran. *Corynebacterium striatum:* an emerging respiratory pathogen. *J Infect Dev Ctries* 2018;12:581–6.

43. Sharma S, Sheoran A, Gupta KB, Yadav A, Varma-Basil M, Sreenivas V, Chaudhary D, Mehta PK. Quantitative detection of a cocktail of mycobacterial MPT64 and PstS1 in tuberculosis patients by real-time immuno-PCR. *Future Microbiol* 2019;14:223–33.

44. Singh A, Gulati K, Chhabra SK, Dubey H, Kalaiselvan V, Ray A. Aggravation of seizure after combined nebulization with albuterol and ipratropium bromide. *J Pharmacol Clin Res* 2018;6:1–2.

45. Singh A, Healey KR, Yadav P, Upadhyaya G, Sachdeva N, Sarma S, Kumar A, Tarai B, Perlin DS, Chowdhary A. Absence of azole or echinocandin resistance in *Candida glabrata* isolates in India despite background prevalence of strains with defects in the DNA mismatch repair pathway. *Antimicrob Agents Chemother* 2018;62:e00195–18.

46. Thokchom S, Gulati K, Ray A, Menon BK, Kumar Raj. Effects of yogic intervention on pulmonary functions and health status in patients of COPD and the possible mechanisms. *Compl Therapies Clin Pract* 2018;33:20–26.

47. Tyagi Uma, Yanthan Zuchamo, Kumar Vinod, Tyagi Anil Kumar. ICT competency framework for LIS professionals in India: a modular quotient. *Annals Library Information Studies* 2018;65:170–6.

48. Vatanshenassan M, Boekhout T, Meis JF, Berman J, Chowdhary A, Ben-Ami R, Sparbier K, Kostrzewa M. Candida auris identification and rapid antifungal susceptibility testing against echinocandins by MALDI-TOF MS. *Front Cell Infect Microbiol* 2019;9:20.

Books

1. Gaur SN, Kumar R, Singh AB, Agarwal MK, Arora N. *Guidelines for Practice of Allergen Immunotherapy in India– A 2017 Update.* Delhi: NCRAAI, V.P. Chest Institute, 2018.

2. Kumar R. *Allergy Testing.* Delhi: NCRAAI, V.P. Chest Institute, 2018.

3. Prasad R, Kumar R. *Allergy Situation in India.* Delhi: NCRAAI, V.P. Chest Institute, 2018.

Chapters in Books

4. Kumar R. Tobacco smoking-related diseases and tobacco cessation. In: Munjal YP, editor *API Text Book of Medicine;* 10th Edition. New Delhi: Jaypee Brothers Medical Publishers (P) Ltd, 2018.

5. Tyagi Uma. Innovative solutions of ICT services to medical professionals: holistic empowerment by public libraries in India. In: Singh KP, editor *Proceedings of National Conference on ERMED - Digital Health India: A Reality.* New Delhi: Allied Publishers Pvt Ltd; 2018:pp 1–7.

6. Varma-Basil M, Bose M. Mapping the footprints of nontuberculous mycobacteria: a diagnostic dilemma. In: Velayati AA, Farnia P, editors *Nontuberculous Mycobacteria: Microbiological, Clinical and Geographical Distribution.* Academic Press; 2019.

Prof. Address Malata and Mauakowa Malata of Malawi University of Science and Technology visited the Institute on September 17,

Vigilance Awareness Week was observed from October 29 – November 3, 2018 at the Institute with a theme "Eradicate Corruption: Build a New India.

A programme on "Basic Fire Fighting Awareness Activities at Different Locations" was held on January 3, 2019. A demo was given by M/s ABC Fire Engineers (India).

Institute observed Swachhta Pakhwada from April 1-15, 2018 and "Special Swachhta Drive – Swachhta Hi Seva" from September 15 – October 02, 2018 at VPCI and its residential complexes.

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