Department of Biochemistry

Brochure
(2012-17)

Department of Biochemistry
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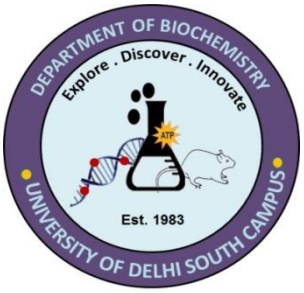
Professor Alo Nag	:	24114159
Dr. Amita Gupta	:	24114172
Dr. Garima Khare	:	24115209
Dr. Suneel Kateriya *(Moved to JNU, New Delhi)*	:	24114159



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GENERAL INTRODUCTION

University of Delhi is among the highest ranked Universities in India. An organization of pre-eminence by itself, South Campus constitutes an integral and essential component of this educational organization of national importance. The small but beautiful campus boasts several state-of-the-art life science departments such as biochemistry, biophysics, genetics, microbiology and plant molecular biology which work with a great deal of synergy. The Department of Biochemistry, one of the most vibrant and premiere biochemistry departments in the country, was established in the year 1983 and started functioning full-fledged in South Campus since 1986. One of the commendable contributions of the department has been the creation and sustenance of a rigorous, dynamic and vibrant master's programme in biochemistry that imparts conventional and new knowledge in an innovative manner, which ensures that fresh, young minds are trained and oriented to create newer knowledge in turn. The two-year full time M.Sc. programme is considered as one of the best in the country as evidenced by the quality of students who complete this course and their achievements. Students are offered advanced level theory and practical courses in various classical and modern areas of biochemistry with utmost emphasis on training students for research. This includes rotation of second-year students in research laboratories to carry out short-term projects with different faculty members. Students are also required to present critical reviews of various topics in seminars for evaluation.

The Department enrolls students for Ph.D. degree from various disciplines. The M.Phil. course in Biotechnology is jointly run by the Departments of Biochemistry, Genetics, Microbiology and Biophysics wherein the students can opt for courses from any of the departments, though this course in this format has been discontinued since 2017. The Department is well equipped with all modern and sophisticated scientific equipments and offers research opportunities in different areas of life sciences. The laboratories are well recognized nationally and internationally. In Department of Biochemistry, teaching over the years has reached impeccable standards and research attained world class quality that has attracted positive attention towards South Campus and the University. We have a world class faculty equipped with equally state-of-the art facilities that constantly churn out productivity – be it extremely well trained students, research publications that are well cited, patents or technology that have reached the market benefitting the common man (diagnostic kits) or ones that have shown great potential for the near future (vaccine, gene therapy, drug delivery, etc). In a small department like ours we boast of Bhatnagar awardees, Fellows of National Academies, GRC members and the numerous other success stories that are still being built. Our faculties have carved out a niche for themselves on the scientific arena. Several faculties have authored book chapters as well, are on several task force committees that take important science decisions and are on-board editorial teams of international journals. Our students are equally productive and attain success regularly in all possible ways.

VISION AND MISSION

- Create, Innovate, Sustain and Promote high standards of academic excellence.

- To impart research based knowledge to students with emphasis on hands-on-training to motivate and inspire future citizens of India who will excel in their chosen area of interest.

- To imbibe the best practice in education and research and maintain the highest level of integrity and operate in the cutting edge of life sciences research.

- To translate the knowledge into meaningful outcome that will benefit human kind and alleviate their suffering.

- To create an all-inclusive vibrant academic programme that will attract the best minds and trigger their thought process.

Faculty Members. ***(Left panel: L-R)*** *Professor Debi P. Sarkar, Professor Vijay K. Chaudhary, Dr. Suneel Kateriya, Professor Prahlad C. Ghosh, Professor Anil K. Tyagi, Professor Alo Nag (AN), Professor Suman Kundu (SK).* ***(Right panel: L-R****), Dr. Amita Gupta, AN, Dr. Garima Khare, SK.*

TEACHING ACTIVITIES

The department had **nine faculty members** (between 2012 and 2017) who taught and performed research in a wide area of life sciences. The department **trains 24 M.Sc. students at a time**, who are well absorbed immediately after by renowned Institutes in India and abroad. The faculties **guide 30-35 Ph.D. students**, who also do extremely well in their future endeavors. Additionally, the department helps students all over the country with short-term training, collection of data as and when required, etc. The department has forged fruitful national and international collaborations over the years and has set up National Service Facilities (like DNA sequencing facility). The department also actively participates in University welfare activities. The department also organizes conferences and seminars for its students.

The Masters' programme endeavours to provide the students with excellent training in Biochemistry emphasizing on solid background of basic concepts as well as rapid advancement in the field. **In addition to theoretical knowledge, considerable emphasis is also given to offer the students hands on experience in the forefront areas of Biochemistry**. In the first year they interact and train extensively with all the faculty members in several basic areas of practical biochemistry learning to design, execute, analyze and present scientific data. They are individually allowed to do experiments and are exposed to very sophisticated, state-of-the-art equipments. Besides, **an important feature of our programme pertains to the dissertation carried out by every student during the second year in the supervision of a mentor.** They are given a short research project with a defined problem that provides them an opportunity to grow in a research environment. It exposes them to various aspects pertaining to research including the habit of scientific reading, research methodology, analytical ability, organizational capability, independent thinking and scientific writing. Thus, they are well trained to join any laboratory of modern biology and start right away without much lag period. This has borne fruit for our masters' students since many of them have co-authored papers and reviews in peer reviewed international journals, attended and presented posters at international and national conferences. The department participated in M.Phil. in Biotechnology course along with the other life science departments. This course was discontinued in 2017.

Following is a summary of all the courses that the department offers:

Name of the course	**Intake**	**Average no. of students passing out per year**	**Major areas of placement of students**
Post-graduate degree **M.Sc.**	24 students (12 in Part I and 12 in Part II) every year	All	Most of them join for Ph.D. in reputed national institutes such as NII, IISc., ICGEB, CCMB, NCCS, and various universities including Delhi University etc. A few go abroad to pursue higher education or seek other jobs in India.

Research degree **i. M.Phil(2012-17)** **ii. Ph.D.**	 Variable Department at any given time has 30-35 Ph.D. students with annual intake of 5-6 students.	 Variable 5-6 students pass out every year	Many of them go abroad for post-doctoral positions after Ph.D. Some join for teaching assignments at various colleges. A few of them get jobs in industry or elsewhere.

In addition, the department regularly organizes seminars by national and international researchers to expose the students to a repertoire of scientific areas and scientific methodology. The department also runs a journal club in which students (both Ph.D. and M.Sc.) regularly present scientific papers throughout the year. Although summer training is not a compulsory part of the curriculum, students are encouraged to undergo summer training in other institutions during summer vacation, especially through national fellowships like those provided by the three Indian academies of sciences. The faculty members help the students in making these arrangements. The department has separately allocated funds for educational tours to support their visits to various institutions / universities / industries to enhance their awareness about various research areas and industrial working. Students are encouraged to attend national and international conferences to expose them to scientists from various national and international institutions and provide them opportunity to learn the latest in science and to interact with established scientific community. Students are also encouraged to present posters and co-author papers and reviews. The department also organizes campus based symposium inviting eminent scientists across the country.

In keeping with the objectives of the University and UGC, the curriculum structure that we follow now for M.Sc is outlined below, which however, will be replaced by CBCS from July 2018.

Programme Structure

Part I	Semesters	Title of papers
	Semester 1	
	BIOCHEM 0701	Proteins – Structure, Folding and Engineering
	BIOCHEM 0702	Essentials of Cell Biology
	BIOCHEM 0703	Membrane Biology
	BIOCHEM 0704	Immunology and Immunotechniques
	BIOCHEM 0705	Practicals
	Semester 2	
	BIOCHEM 0801	Enzymes and Techniques in Biochemistry
	BIOCHEM 0802	Seminar Paper
	BIOCHEM 0803	Molecular Biology: Gene Structure, Expression and Regulation
	PMBB 0804	*Bioinformatics
	BIOCHEM 0805	Practicals

Part II	**Semester 3**	
	BIOCHEM 0901	Cellular Signalling
	BIOCHEM 0902	Recombinant DNA Technology and Applications
	BIOCHEM 0903	Seminar Paper
	BIOCHEM 0904	Molecular Biology: Genome Replication, Repair and Eukaryotic Transcription
	BIOCHEM 0905	Dissertation
	Semester 4	
	BIOCHEM 1001	Developmental Biology
	BIOCHEM 1002	Advanced Techniques in Genomics
	MICROBIO0804	*Microbial Pathogenicity
	BIOCHEM 1004	Proteomics and Metabolomics
	BIOCHEM 1005	Dissertation

**multi-disciplinary course offered by the Department of Plant Molecular Biology and Biotechnology and Department of Microbiology.*

Each faculty in the department takes immense pride in teaching and almost equally share teaching responsibilities. The courses taught by the faculties are as follows:

Prof. Anil. K. Tyagi – Molecular Biology –I (till May 2014)

Prof Vijay K. Chaudhary – Recombinant DNA Technology and Applications; Advanced Techniques in Genomics

Prof. Prahlad C. Ghosh – Cell Biology – I (till January 2018)

Prof. Debi P. Sarkar – Membrane Biology; Immunology and Immunotechniques (till December 2017)

Prof. Suman Kundu – Proteins: Structure, Folding and Engineering; Enzymes and Techniques in Biochemistry

Prof. Alo Nag – Molecular Biology: Genome Replication, Repair and Eukaryotic Transcription; Developmental Biology

Dr. Amita Gupta – Immunology and Immunotechniques, Molecular Biology: Gene Structure, Expression and Regulation

Dr. Garima Khare – Cellular Signalling, Proteomics and Metabolomics

Dr. Suneel Kateriya – Cell Biology – II (Cellular Signalling); Applications of Proteomics and Metabolomics (till April 2015)

The M.Sc. students from the Department of Biochemistry take the following interdisciplinary courses offered by other Life Sciences departments on the campus:

1. Microbial Pathogenicity - Department of Microbiology (**Prof. J.S. Virdi, Dr. Rajeev Kaul**)
2. Bioinformatics - Department of Plant Molecular Biology and Biotechnology (**Dr. Saurabh Raghuvanshi**)

The Seminar paper and Practical training are joint responsibilities of all faculties. Each faculty trains the students in the laboratory in specific area during dissertation.

Our Enthusiastic M.Sc. students

RESEARCH ACTIVITIES AND ACHIEVEMENTS

With regard to research, the faculty members continuously strive to improve the research culture and methodology. The department provides excellent infrastructure and attracts extra-mural funding regularly. The faculty members have national as well as international collaborations to leverage the scientific advantage and develop mutually beneficial scientific interactions. Besides, the faculty members attend national and international conferences to create opportunities to learn about new developments and have personal interactions with the scientific community. New and emerging areas of research are practiced and pursued in the department as well.

The Ph.D. programme of the department has been extremely successful with specialized focus on **"Development of Molecular Strategies to Combat Various Human Diseases"**. The emphasis has been both on basic and applied research. The faculty engages in **research dealing with Diagnostics, Drugs, Drug Delivery, Vaccines as well as Mechanistic Insight to combat Tuberculosis, Cancer, Cardiovascular Diseases, Malaria and Viral diseases**.

Students are admitted in the Ph.D programme through a National Level Entrance Examination consisting of written test and interview. Students enrolled in the Ph.D programme need to complete course work over 1-2 semesters, before their Ph.D registrations are confirmed. The **Ph.D course work** consists of the following courses including a mandatory Research Methodology paper:

Paper I (Biochem P-I) : Research Methodology

Paper II (Biochem P-II) : Tools and Techniques in Biochemistry – I

Paper III (Biochem P-III) : Tools and Techniques in Biochemistry - II

A talented group of students engages in diverse research activities and keep the research environment lively and productive.

Ph.D. Scholars Currently Enrolled : 23 (in addition, four are awaiting Ph.D. viva)

LIST OF Ph.D. STUDENTS WHO ARE CURRENTLY ON THE ROLLS OF THE DEPARTMENT OF BIOCHEMISTRY

S.No.	Name of the Scholar	Name of the supervisor/s	Topic	Year of enrolment
1.	Ms Shubhita Mathur	Prof. Vijay K. Chaudhary	Development and evaluation of vaccines against tuberculosis	2013
2.	Ms. Swati Singh	Dr. Garima Khare	Characterization of novel drug targets and identification of inhibitory molecules against *Mycobacterium tuberculosis*	2013
3.	Ms. Pushpanjali Dasauni	Prof. Suman Kundu	Identification and characterization of hemoglobin disorders using spectroscopic, mass spectrometric and 2D-DIGE methods	2013
4.	Mr. Avijit Podder	Dr. N. Latha, SV College	Computational Studies of Drug Targets in Dopaminergic System Implicated in Neurological Disorders	2014
5.	Mr. Pradeep Singh Cheema	Prof. Alo Nag	Molecular characterization of the regulation and function of FOXM1	2014
6.	Ms. Yama Atri	Prof. Alo Nag	Elucidation of the molecular function of E3 ligase, Cullin4A in Human Cancer.	2015
7.	Ms. Simran Kaur	Prof. Alo Nag	Effect of Immunomodulation on radiation induced inflammation and damage	2015
8.	Mr. Gaurav Kumar	Prof. Suman Kundu	Biochemical and biophysical characterization of therapeutic protein and enzyme targets to combat cardiovascular diseases	2015
9.	Mr. Sanjeev Kumar Yadav	Prof. Suman Kundu	Investigation of regulation of ligand binding and stability determinants	2015

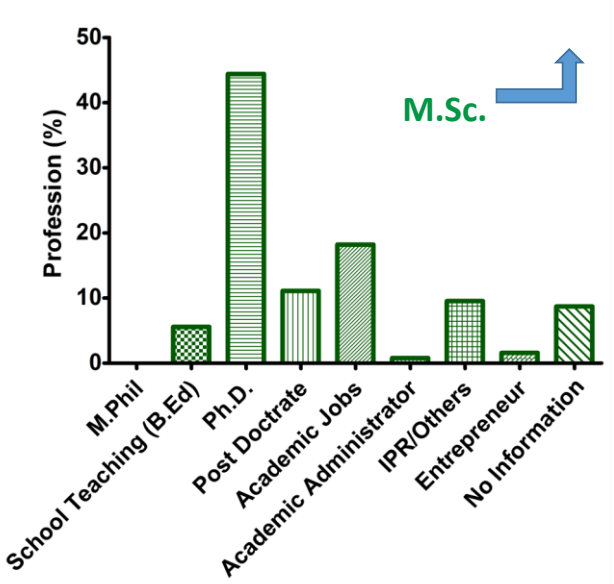
			in novel hemoglobins with applications in blood substitutes	
10.	Mr. Mohd. Asim Khan	Prof. Suman Kundu	Structural and functional characterization of recombinant hemoglobins and their mutants with implications in the production of blood substitutes	2015
11.	Ms. Manisha Saini	Prof. Suman Kundu	Structure based identification and design of small molecules against protein targets as potential therapeutics for cardiovascular diseases and rheumatoid arthritis	2015
12.	Ms. Hina Bharti	Prof. Alo Nag	Mechanistic approach to identify drug targets against malaria and developing effective treatment strategies	2015
13.	Ms. Deeptashree Nandi	Prof. Alo Nag	Deciphering the role of FOXM1 in development and progression of Hepatocellular Carcinoma	2015
14.	Ms. Simran Kaur	Dr. Garima Khare	Devising intervention strategies to combat latent tuberculosis	2016
15.	Ms. Chetna Dhembla	Prof. Suman Kundu	Characterization of proteins essential in fatty acid biosynthesis pathway of *Leishmania major*	2017
16.	Ms. Aakriti Singal	Prof. Alo Nag	Understanding the pathogenesis of Malaria and development of new therapeutic approaches	2017
17.	Ms. Nikita Goswami	Dr. Garima Khare	Identification of novel inhibitors against *Mycobacterium tuberculosis* to combat tuberculosis	2017
18.	Ms. Neha Lalwani	Dr. Garima Khare	Understanding Host-Pathogen interactions of *Mycobacterium tuberculosis*	2017
19.	Ms. Neha Panwar	Prof. Debi P. Sarkar	Targeted drug delivery by nanoparticle entrapped virosomes	2017
20.	Ms. Nupur	Dr. Garima Khare	Employing various Drug discovery approaches for the control of tuberculosis	2017
21.	Mr. Rajeshwar Patle	Prof. Alo Nag	Study on expression of miRNAs in development of Oral cancer	2017
22.	Mr. Nikhil Bhalla	Dr. Amita Gupta	Understanding the role of Toxin-Antitoxin Modules in *Mycobacterium tuberculosis*	2017
23.	Ms. Aakanksha Kadam	Dr. Amita Gupta	Understanding the Regulation of Toxin-Antitoxin Loci of *Mycobacterium tuberculosis*	2017

Our Talented Research Scholars

In addition, Ms. Shivani Sharma, Ms. Nidhi Gupta and Mr. Mohsin Raza are awaiting their Ph.D defense.

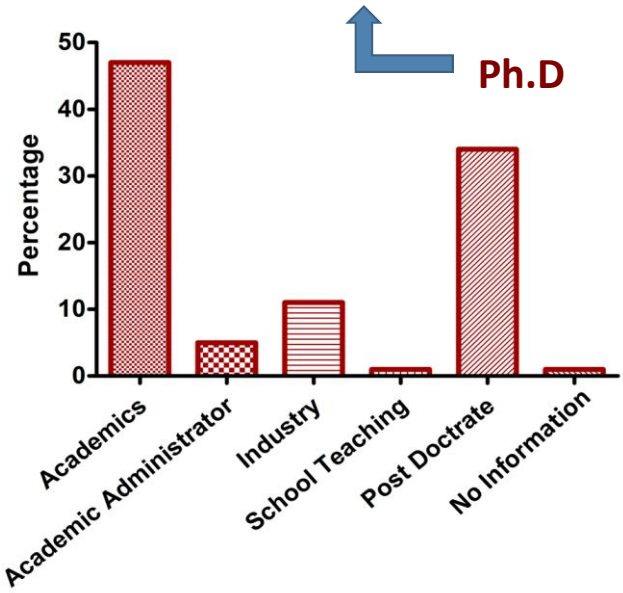
Our department is also well served by talented and dedicated ***post-doctoral fellows*** and ***research associates***. Currently, there are five such fellows in the department: Dr. Prachi Nangpal, Dr. Pankaj Prabhakar, Dr. Sunandini Chandra, Dr. Sanjay Kumar Dey, Dr. Akshay Rohilla.

Programme Outcome of M.Sc. and Ph.D. Course in the Department: How students move into the Professional world



2 Entrepreneurs !!

Ph.D. in Best institutes across the globe.
Others include Industry/Govt. jobs
No information also includes students who passed out recently……

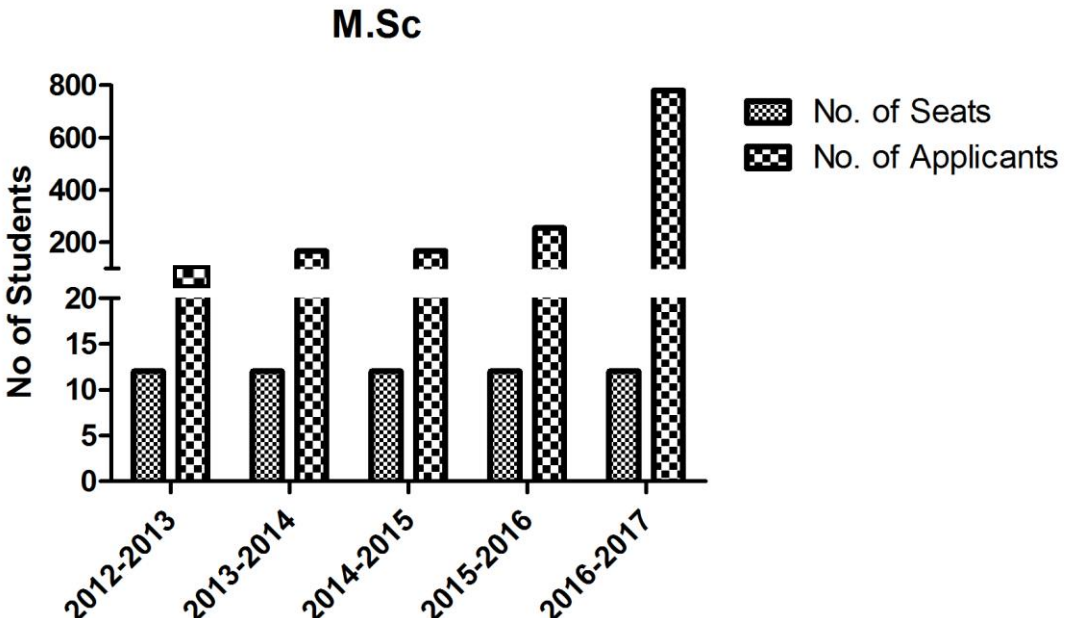


Several in academia!!

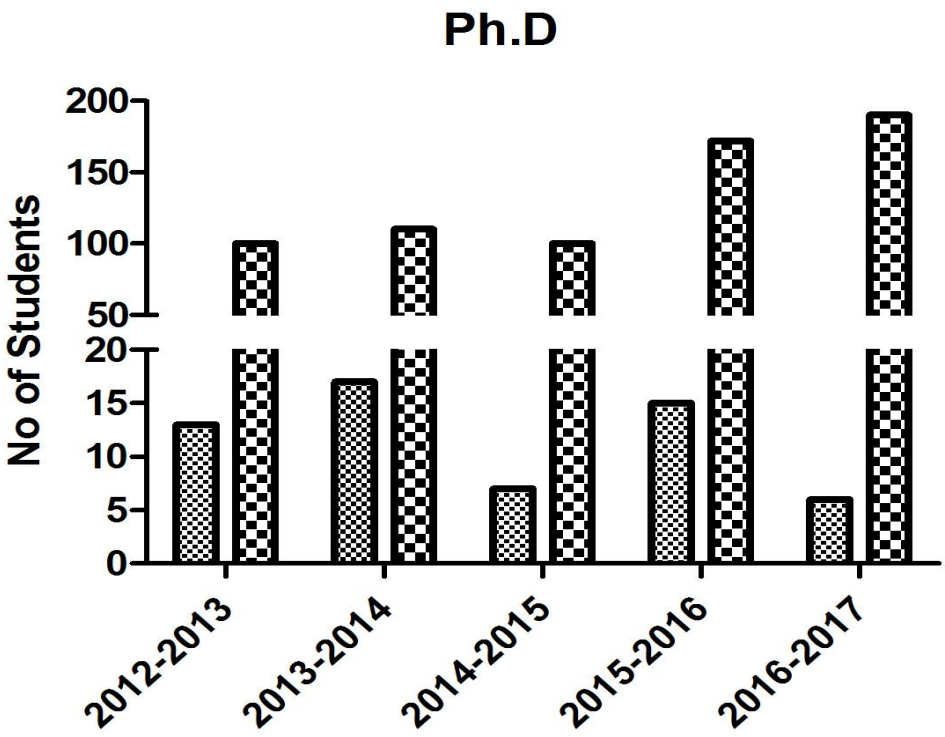
One student is now Director, IMTECH.
Others directors of centers (admin).
Very few drop outs …..
Spread across the globe …

Course Demand Ratio

For M.Sc. Biochemistry Course



For Ph.D. Biochemistry Course



The demand ratio for the both the courses are on the rise.

Theme of Research Activities in the Department

"Development of Molecular Strategies to Combat Various Human Diseases"

(Diagnostics, Drugs, Drug Delivery, Vaccines, Mechanistic Insight to combat Tuberculosis, Cancer, Cardiovascular diseases, Malaria, Viral diseases)

Professor Anil K. Tyagi
(**Specialization:** Tuberculosis with special reference to the development of new TB vaccines and drug discovery against TB)

Dr. Tyagi's laboratory has been working on the development of vaccines against tuberculosis. Detailed evaluation of the promising candidate vaccines against aerosol infection of *M. tuberculosis* in guinea pigs was carried out by using heterologous prime boost approach. In this study, three regimens comprising of (i) recombinant BCG overexpressing Ag85C, (ii) recombinant BCG overexpressing β-crystallin as the priming agent followed by boosting with a DNA vaccine expressing the same antigen and (iii) BCG as priming agent followed by boosting with DNA vaccine expressing β–crystallin showed extremely good results and imparted a superior and sustained protection in comparison to the present BCG vaccine both on the basis of reduction in the bacillary load in lung and spleen as well as histopathological changes. The Tuberculosis Vaccine Clinical Trial Expert Group (TVCTEG) of the Department of Biotechnology, Government of India, has in principle recommended these vaccine regimens for human clinical trials. Currently, upstream pre-clinical work on these candidate vaccines is in progress so that eventually the human clinical trials can be initiated.

Few years ago, focusing towards the development of new anti-tubercular therapeutic molecules, Dr. Tyagi's laboratory started structure determination of important mycobacterial proteins and characterization of these novel drug targets. His laboratory has already determined the structure of four new mycobacterial proteins and the process of developing inhibitors against these targets is in process. In view of the importance of mymA operon in the survival of *Mycobacterium tuberculosis*, Dr. Tyagi's laboratory has characterized in details one of the important enzymes of this pathway and determined its structure. By using the targets identified in his laboratory, Dr. Tyagi and colleagues have identified several lead molecules for the inhibition of mycobacteria.

In a multicentric project, with Dr. Tyagi's laboratory being the nodal constituent, it has been shown that *Mycobacterium indicus pranii* (earlier name *Mycobacterium w*.) has

been the predecessor of highly pathogenic *Mycobacterium avium intracellulare* complex (MA/C) that did not resort to parasitic adaptation by reductional gene evolution and therefore, preferred a free living life-style. Further analysis suggested a shared aquatic phase of MA/C bacilli with the early pathogenic forms of *Mycobacterium*, well before the latter diverged as `specialists'. This evolutionary paradigm affirms to marshal our understanding about the acquisition and optimization of virulence in mycobacteria and determinants of boundaries therein. Following these studies, the sequencing of complete genome of *Mycobacterium indicus pranii* has been carried out at University of Delhi South Campus and published recently. This paper represents publication of the first completed genome of a new bacterial species from our country.

Professor Vijay K. Chaudhary
(**Specialization:** Development of novel reagents for diagnostic test for infectious diseases using state-of-the-art protein engineering technologies including human antibodies)

Dr. Chaudhary's group has developed a rapid test "TBConfirm"for the culture confirmation of *M. tuberculosis*. The technology of production TBConfirm test has been transferred to M/s SPAN Diagnostics Limited, Surat. The MoA/MoU was signed on 26th August 2011 by Professor Umesh Rai, Director, UDSC; Dr Pradeep Desai, Chairman, SPAN Diagnostics Ltd. and Dr Bindu Dey, Advisor, DBT in the presence of Professor Dinesh Singh, Vice Chancellor, University of Delhi and Dr. M.K. Bhan, Secretary, DBT. The kit has performed well in multi centric trial with near 100% sensitivity and 100% specificity. The product "TBConfirm" will be available soon in the market as the company is about to get commercial manufacturing license. Under a CSIR-NIMITLI project Technology is being developed to construct a phage displayed human antibody library containing 10^9 independent clones.

Professor Prahlad C. Ghosh
(**Specialization:** Drug Delivery using Liposomes and Nanoparticles as Carriers)

Prof. P.C. Ghosh's laboratory mainly focuses on drug delivery using liposomes, PLGA nanoparticles and solid lipid nanoparticles as carriers of therapeutic molecules for the treatment of infectious and cancerous diseases. Prof. Ghosh's group has successfully delivered various toxins and therapeutic molecules to cancerous cells using targeted and long circulatory liposomal formulations. The group has also developed cholesterol hemisuccinate vesicles that were shown to efficiently deliver Amphotericin-B for the treatment of fungal infection, aspergillosis. Moreover, his group has developed PLGA nanoparticles loaded with herbal compounds like curcumin and piperine for the chemotherapeutic interventions against cancer. Another PLGA nanopreparation entrapping monensin was shown to be highly effective in inhibiting the growth of malaria parasite *P. falciparum* in culture. Recent activities in the lab involves use of various liposomal formulations of carboxylic ionophores for anti-malarial therapy. Prof. Ghosh's group has also used stearylamine liposomes for delivery of anti-miR-191 into breast cancer cells.

Professor Debi P. Sarkar
(**Specialization:** Host-virus Interactions/Molecular Cell Biology/Virology)

Dr. Sarkar's group attempted to perform a global investigation of protein alterations in hepatoma cells in response to Sendai virus infection. This study is the first step towards improving our understanding of the complex cellular events that occur during virus infection in liver cell line. The differential profiling of liver cells with and without virus infection was performed first by conventional two-dimensional gel electrophoresis and also by the improved 2D-DIGE (Difference gel electrophoresis). This will help us to elucidate the virus – host interactions which may help in increasing the efficiency of virosome mediated delivery for liver directed gene therapy and for developing new vaccines based on viral vectors. Relevant high end techniques of 2D-DIGE have been thoroughly standardized and work is under way. No publishable results are ready yet.

Preclinical gene therapy studies with a gunn rat model, supported jointly by NRDC, New Delhi and AECOM, USA is going on for treating jaundice (Crigler-Najjar Syndrome, Type I Jaundice) with Sendai virus based F-virosome entrapped bilirubin-UDP glucouronysyl transferase (BUGT) gene to liver cells. Negotiation with various pharma companies through NRDC, New Delhi is going on with our PCT patent published on March, 2011 for a clinical trial. Details can't be disclosed at this moment for the interest of confidentiality agreement.

Professor Suman Kundu
(**Specialization:** Structure-Function Relationship and Protein Engineering in Hemoglobins and Artificial Blood Substitutes; Diagnosis of Hemoglobinopathies; Rational Drug Design (Cardiovascular Diseases, Cancer)

Dr. Kundu's group has extensively investigated several new hemoglobins from various organisms that led to novel insight into their stability, regulation of ligand binding and putative function. His lab has provided insight into aggregation and fibril formation of some important hemoglobins. His group has designed proof-of-principle mass spectrometric, FTIR and Mossbauer spectroscopic methods for precise identification of mutations leading to structural hemoglobin disorders and other blood disorders. Utilizing all the knowledge gained over the years, his group is currently investigating ways to improve stabilities in recombinant hemoglobin using protein engineering technologies to be able to design artificial blood substitutes. Dr. Kundu's group provided the first three-dimensional model for Dopamine-b-Hydroxylase, a drug target for complex traits. The structure conforms very well to known biochemical data. Several SNPs have been mapped onto the structure and testable hypotheses have been forwarded as to their influence on structure-function relationship of the protein. The model provides an impetus for drug design, especially against cardiovascular diseases. His lab has screened several small molecule libraries against the therapeutic enzyme with success. Few of the molecules showed promising inhibition in vitro and regulated high blood pressure in rat models of hypertension.

Professor Alo Nag

(**Specialization:** Molecular mechanisms of oncogenesis; Cell cycle regulation; Tumour suppression pathways; Role of posttranslational machinery; Discovery of novel therapeutic targets against cancer; Drug delivery)

The major research interest of Prof. Alo Nag's laboratory is to enhance basic understanding of the molecular mechanisms of tumor development. Ongoing research projects are mostly designed to investigate the key molecular events responsible for transformation of normal cells into cancerous cells. The long term research goal is to unravel the root cause of the disease and exploit this knowledge to develop improved strategies to combat cancer.

With regard to the above objective, the lab is actively involved in investigating unknown oncogenic functions of Human Papillomavirus. This as an effort towards identification of novel molecular targets against HPV related malignancies including Cervical cancer, a major killer among Indian women. Prof. Nag's group has uncovered several novel mechanisms of HPV mediated oncogenesis.

The lab is also interested in another cancer therapy target, FoxM1, a master regulator of cell cycle implicated in oncogenesis and metastasis. This lab is particularly interested in studying the mechanism that underlie FoxM1 upregulation during tumorigenesis. Recent findings from the lab have revealed interesting roles of posttranslational mechanisms in modulation of FoxM1 function as well as its expression in cancer cells.

Study of tumor suppression mechanisms is yet another research focus of this lab. Prof. Nag's group is trying to address the enigmatic functions of Cytoglobin (CYGB). Their findings not only confirmed CYGB's anti-proliferative role but also provided novel evidences for its involvement in cell cycle regulations.

Dr. Amita Gupta

(**Specialization:** Molecular mechanisms of action of toxin-antitoxin loci, identification of new biomarkers for detection of TB, development of molecular assays and immunoassays for infectious diseases)

Our group has been working on identification and characterization of Toxin-antitoxin (TA) loci of *M. tuberculosis* (Mtb). In this context, we have characterized genome-wide TA loci of Mtb for their activity and killing action. We have further delineated the expression profile of all the hitherto identified TA loci of Mtb and identified those loci that play a crucial role in Mtb survival under nutritional stress and chemical/antibiotic stress. We are further characterizing the regulatory elements of some of these loci in order to understand the signals that lead to their activation and deactivation. We have also initiated work on identifying drug-resistance markers for Mtb that can be used to develop molecular assays to detect drug resistance.

Dr. Garima Khare

(**Specialization:** Drug discovery against Tuberculosis and understanding the host-pathogen interactions involved in Tuberculosis)

The research interests of the laboratory primarily pertain to the identification of novel inhibitors against *Mycobacterium tuberculosis*, the causative agent of tuberculosis, which can be developed into potent drugs against TB. The work involves the use of structure based strategy as well as high throughput phenotypic screening based strategy to identify small molecules against important drug targets as well as against the growth of *Mycobacterium tuberculosis in vitro* and inside macrophages. Subsequently, the cytotoxicity assays are performed and the promising inhibitors are then evaluated in mice model of tuberculosis to check the efficacy of the compounds towards the treatment of the disease. In addition, the research efforts are dedicated towards the understanding of host-pathogen interactions involved in TB pathogenesis and role of important mycobacterial genes in the pathogenesis and growth of the pathogen in the host by developing gene knockout mutants and correlating the loss of gene function with the establishment and progression of the disease and ability of the mutant pathogen to survive in the host.

Future plans include reengineering/optimization of candidate inhibitory compounds identified in the lab to increase their potency and efficacy towards the inhibition of *M.tuberculosis* growth. Attempts to develop more rapid and accurate inhibitor screening strategies against *M.tuberculosis* would be made. The efforts would also be directed towards the understanding of the stress responses in the bacteria when it encounters the host milieu and trying to identify pathways associated with acidic stress in the bacteria which would be crucial for adaptation and survival of the pathogen under harsher conditions.

Dr. Suneel Kateriya

(**Specialization:** Molecular basis of the rhodopsin mediated signaling, Optogenetics, Channelopathy and Ciliopathy)

Our lab is working towards understanding photoreceptor mediated signaling in Algae, pathogenic protozoa and human bacterial pathogens. We are also developing light-sensitive protein tools and nano-device(s) for Cell Biology, Neurosciences and clinical applications by using inter-disciplinary approaches.

Achievements of Faculties: A summary

- Vice Chancellor (GGS Indraprastha University, Delhi)
- Director (IISER, Mohali)
- Director (CIIDRET, Delhi University)
- Fellows of National Academies
- Task Force Members (DBT, DST, CSIR, UGC)
- Chief Editors and Editorial Board Members of Journals
- Members of Executive Councils of Societies
- Reviewers of Grants and Manuscripts for Journals; Examiners
- Publications, Patents, Grants, Awards, Innovations, Technology Transfers and Commercialization

Awards and Recognition of Faculties: Glimpses

SS Bhatnagar Awards

J.C. Bose Fellowships

Fellows of National Academies

GRC Memberships

President's Innovation Award

Oration Awards

Technology Awards

State Government Science Awards

Young Scientists Award

Travel Awards

Appreciation Awards

Indo-US Research Fellow

Visiting Scientists Abroad

Best Paper Awards

Society Recognitions

Publications

SUMMARY OF PUBLICATIONS IN THE LAST FIVE YEARS (2012-17)

Number of Papers published : 101
Number of Books with ISBN : 3
Number of Citation Index – range / average : Range: 180-1581; Average: 813 per faculty
Number of Impact Factor – range / average : Range: Lowest IF = 0.45; Highest IF = 9.6; Average:3.5 per publication

h-index : Range : 12-31; Average : 20 (per faculty)
SNIP : 1.177
SJR : 1.817

Publications

2018 (most recent)

1. Raza, M., Bharti, H., Singal, A., **Nag, A.*, Ghosh, P.C.*** (2018). Long circulatory liposomal maduramicin inhibits the growth of *Plasmodium falciparum* blood stages in culture and cures murine models of experimental malaria. Nanoscale. 10(28):13773-13791. doi: 10.1039/c8nr02442a. **[I.F. 7.367]** (*Corresponding authors).
2. Kaur, S., **Nag, A.**, Singh, A.K. & Sharma, K. (2018). PPARγ-targeting potential for radioprotection. Current Drug Targets. doi: 10.2174/1389450119666180131105158. **[I.F: 3.5].**
3. Verma, V., Kaur, C., Grover, P., Gupta, A. & **Chaudhary, V.K.** (2018). Biotin-tagged proteins: Reagents for efficient ELISA-based serodiagnosis and phage display-based affinity selection. PLoS One 13(1): e0191315. [**I.F. 2.806]**.
4. Shankar, A., Fernandes, J.L., Kaur, K., Sharma, M., **Kundu, S.** & Pandey, G.K. (2018). Rice phytoglobins regulate responses under low mineral nutrients and abiotic stresses in *Arabidopsis thaliana*. Plant Cell and Environment 41(1):215-230. doi: 10.1111/pce.13081. **[I.F. 6.17].**
5. Singh, S., **Khare, G.,** Kar, R., Ghosh, P.C., & **Tyagi, A.K.** (2018). Identification of *Mycobacterium tuberculosis* BioA inhibitors by using structure based virtual screening. Drug Design, Development and Therapy, 12, 1065–1079. **[I.F. 2.822]**
6. Rohilla, A., **Khare, G.,** & **Tyagi, A.K.** (2018). A combination of docking and cheminformatics approaches for the identification of inhibitors against 4′ phosphopantetheinyl transferase of *Mycobacterium tuberculosis*. RSC Advances, *8*(1), 328-341. **[I.F. 3.108]**
7. Ahmad, J., Farhana, A., Pancsa, R., Arora, S. K., Srinivasan, A., **Tyagi, A. K.,** & Hasnain, S. E. (2018). Contrasting Function of Structured N-Terminal and Unstructured C-

Terminal Segments of *Mycobacterium tuberculosis* PPE37 Protein. mBio, *9*(1), e01712-17. **[I.F. 6.956]**

8. Bahal, R. K., Mathur, S., Chauhan, P., & **Tyagi, A.K.** (2018). An attenuated quadruple gene mutant of *Mycobacterium tuberculosis* imparts protection against tuberculosis in guinea pigs. Biology Open, *7*(1), bio029546. **[I.F. 2.09]**

2012-2017 (selected publications only)

1. Nangpal, P., Bahal, R. K., & **Tyagi, A.K.** (2017). Boosting with recombinant MVA expressing *M. tuberculosis* α-crystallin antigen augments the protection imparted by BCG against tuberculosis in guinea pigs. Scientific Reports, *7*(1), 17286. **[I.F. 4.259].**
2. Rohilla, A., **Khare, G.,** & **Tyagi, A.K.** (2017). Virtual Screening, pharmacophore development and structure based similarity search to identify inhibitors against IdeR, a transcription factor of Mycobacterium tuberculosis. Scientific Reports, *7*(1), 4653. **[I.F. 4.259]**
3. Chandra, S., Kalaivani, R., Narayanaswamy Srinivasan, M.K. and **Sarkar, D.P**. (2017). Sendai virus recruits cellular villin to remodel actin cytoskeleton during fusion with hepatocytes. Molecular Biology of the Cell, 28:26 3801-3814. **[IF: 4.803].**
4. Sharma, S., Rajendran, V., Kulshreshtha, R., & **Ghosh, P.C.** (2017). Enhanced Efficacy of anti-miR-191 Delivery through Stearylamine Liposome Formulation for the treatment of Breast Cancer Cells. International Journal of Pharmaceutics, 530, 387-400. **[I.F. 3.6].**
5. John, R., Atri, Y., Chand, V., Jaiswal, N., Raj, K., & **Nag, A**. (2017). Cell Cycle-Dependent Regulation of Cytoglobin by Skp2. FEBS Letters. 591, 3507-3522. **[I.F. 3.9**].
6. Gupta, A., Venkataraman, B., Vasudevan, M., & Gopinath Bankar, K. Co-expression network analysis of toxin-antitoxin loci in *Mycobacterium tuberculosis* reveals key modulators of cellular stress. 2017. Sci Rep, 7(1), 5868. ISSN - 2045-2322 (online) **[IF-4.26].**
7. Rajendran, V., Hasan, G.M., Kumar, N., Dutt, S., Garg, N., Tiwari, P., & **Ghosh, P.C.** (2016). Therapeutic efficacy of chloroquine in long circulating liposome formulations against chloroquine-resistant Plasmodium berghei infection in mice. European Journal of Biomedical and Pharmaceutical Sciences, 3, 258-264. **[I.F.** : **4.9].**
8. Rajendran, V., Rohra, S., Raza, M., Hasan, G. M., Dutt, S., & **Ghosh, P.C.** (2016). Stearylamine liposomal delivery of monensin in combination with free artemisinin eliminates blood stages of plasmodium falciparum in culture and P. berghei infection in murine malaria. Antimicrobial Agents and Chemotherapy, 60, 1304-1318. **[I.F. : 4.47]**.
9. Uppal, S., Singh, A.K., Arya, R., Tewari, D., Jaiswal, N., Kapoor, A., Bera, A.K., Nag, A. and **Kundu, S.** (2016) Phe28B10 Induces Channel-Forming Cytotoxic Amyloid Fibrillation in Human Neuroglobin, the Brain-Specific Hemoglobin**.** *Biochemistry* 55(49), 6832-6847**. [I.F.: 2.876].**
10. Mukhi, N., Dhindwal, S., Uppal, S., Kapoor, A., Arya, R., Kumar, P., Kaur, J. and **Kundu, S.** (2016) "Structural and functional significance of the N- and C-terminal appendages in *Arabidopsis* truncated hemoglobin". *Biochemistry*. 55, 1724-1740. **[I.F.: 2.876].**
11. Rahman, S. A., Singh, Y., Kohli, S., Ahmad, J., Ehtesham, N. Z., **Tyagi, A. K.,** & Hasnain, S. E. (2015). Reply to '"Mycobacterium indicus pranii" is a strain of Mycobacterium intracellulare':"M. indicus pranii" is a distinct strain, not derived from M.

intracellulare, and is an organism at an evolutionary transition point between a fast grower and slow grower. *MBio*, *6*(2), e00352-15. **[I.F. 6.975]**

12. Singh, V., Kaur, C., **Chaudhary**, **V.K.**, Rao, K.V.S. & Chatterjee, S. (2015). *M. tuberculosis* Secretory Protein ESAT-6 Induces Metabolic Flux Perturbations to Drive Foamy Macrophage Differentiation". Scientific Reports vol (5), Article number: 12906. **[I.F. : 2016: 4.259]**.
13. Das, P., Saha, S., Chandra, S., Das, A., Dey, S.K., Das, M.R., Sen, S., **Sarkar, D.P.** & Jana, S.S. (2015). Phosphorylation of Nonmuscle myosin II-A regulatory light chain resists Sendai virus fusion with host cells. Scientific Reports (Nature Group), 5, 10395. **[IF:5.578].**
14. Uppal, S., Salhotra, S., Mukhi, N., Zaidi, F.K, Seal, M., Ghosh Dey, S., Bhat, R. & **Kundu, S.** (2015) "Significantly enhanced heme retention ability of myoglobin engineered to mimic the third covalent linkage by non-axial histidine to heme (vinyl) in *Synechocystis* hemoglobin". *J. Biol. Chem*. 290, 1979-1993. [**I.F. : 4.89].**
15. Jaiswal, N., John, R., Chand, V., & **Nag, A**. (2015). Oncogenic human papillomavirus16E7 modulates SUMOylation of FoxM1b. The International Journal of Biochemistry & Cell Biology, 58C, 28-38. **[I.F. : 4.24].**
16. Rahman, S. A., Singh, Y., Kohli, S., Ahmad, J., Ehtesham, N. Z., **Tyagi, A. K.,** & Hasnain, S. E. (2014). Comparative analyses of nonpathogenic, opportunistic, and totally pathogenic mycobacteria reveal genomic and biochemical variabilities and highlight the survival attributes of Mycobacterium tuberculosis. *MBio*, *5*(6), e02020-14. **[I.F. 6.786]**
17. **Chaudhary, V.K.,** Shrivastava, N., Verma, V., Das, S., Kaur, C., Grover, P., Gupta, A. (2014). "Rapid Restriction Enzyme-Free Cloning of PCR Products: A High-Throughput Method Applicable for Library Construction". PLoS One 9(10): e111538. **[I.F. : 2016: 2.806**].
18. Mohammad, Z.K., Khan, I., Prashant, M., **Sarkar, D.P.**, Chattopadhyay, P. & Sinha, S. (2014). Epigenetic repression of c-Myc P2 promoter by Sendai F-virosome mediated delivery of tumor specific shRNA in Hepatoma cells. Molecular Biology of Cell, vol. 25 no. 25, 3987. **[IF : 4.466].**
19. John, R., Chand, V., Chakraborty, S., Jaiswal, N., & **Nag, A**. (2014). DNA damage induced activation of Cygb stabilizes p53 and mediates G1 arrest. DNA Repair, 24, 107-112. **[I.F. : 3.2].**
20. Chand, V., John, R., Jaiswal, N., Johar, S., & **Nag, A.** (2014). High risk HPV16E6 stimulates hADA3 degradation by enhancing its SUMOylation. Carcinogenesis, 35, 1830-9. **[I.F. : 5.76].**
21. Sharma, P., & **Nag, A.** (2014). CUL4A ubiquitin ligase: a promising drug target for cancer and other human diseases. Open Biology, 4, 130217. **[I.F. : 5.78].**
22. Venkataraman, B., Vasudevan, M. & Gupta, A. (2014). A new microarray platform for whole-genome expression profiling of *Mycobacterium tuberculosis.* J Microbiol Methods. 97: 34-43. **[I.F. : 2.09]**.
23. Khare, G., Kumar, P., & **Tyagi, A. K**. (2013). Whole-cell screening-based identification of inhibitors against the intraphagosomal survival of *Mycobacterium tuberculosis*. *Antimicrobial agents and chemotherapy*, *57*(12), 6372-6377. **[I.F. 4.565]**.
24. Khare, G., Reddy, P. V., Sidhwani, P., & **Tyagi, A. K.** (2013). KefB inhibits phagosomal acidification but its role is unrelated to *M. tuberculosis* survival in host. *Scientific reports*, *3*, 3527. **[I.F.5.078]**

25. Reddy, P.V., Puri, R.V., Chauhan, P., Kar, R., Rohilla, A., Khera, A., & **Tyagi, A.K.** (2013). Disruption of mycobactin biosynthesis leads to attenuation of *Mycobacterium tuberculosis* for growth and virulence. *The Journal of infectious diseases*, *208*(8), 1255-1265. **[I.F. 5.848]**.
26. Chauhan, P., Jain, R., Dey, B., & **Tyagi, A. K.** (2013). Adjunctive immunotherapy with α-crystallin based DNA vaccination reduces Tuberculosis chemotherapy period in chronically infected mice. *Scientific Reports*, *3*, 1821. **[I.F. 5.078]**
27. Gupta, A., Shrivastava, N., Grover, P., Singh, A., Mathur, K., Verma, V., Kaur, C., **Chaudhary, V.K.** (2013). "A novel helper phage enabling construction of genome-scale ORF-enriched phage display libraries". PLoS One 8(9): e75212. **[I.F. : 2016: 2.806].**
28. Ray, U., Roy, C.L., Kumar, A., Mani, P., Joseph, A.P., Sudha, G., **Sarkar**, **D.P.,** Srinivasan, N. & Das, S. (2013). Inhibition of the interaction between NS3 protease and HCV IRES with a small peptide: A novel therapeutic Strategy. Molecular Therapy, 21:57-67 **[IF: 6.8]**.
29. Gupta, A., Shrivastava, N., Grover, P., Singh, A., Mathur, K., Verma, V., Kaur, C. & **Chaudhary, V.K.** (2013). *A Novel Helper Phage Enabling Construction of Genome-Scale ORF-Enriched Phage Display Libraries.* PLoS One. 8(9): e75212. **[IF- 2.8]**.
30. Mukhi, N., Dhindwal, S., Uppal, S., Kumar, P., Kaur, J**.** & **Kundu, S.** (2013) "X-ray crystallographic structural characteristics of *Arabidopsis* hemoglobin 1 and their functional implications". *Biochim. Biophys. Acta* 1834**,** 1944-1956. [**I.F. : 3.73].**
31. Venkataraman, B., Gupta, N. & **Gupta, A.** (2013). A robust and efficient method for the isolation of DNA-free, pure and intact RNA from *Mycobacterium tuberculosis.* J Microbiol Methods. 93(3): 198-202. **[IF- 2.09]**.
32. Jain, R., Dey, B., & **Tyagi, A.K.** (2012). Development of the first oligonucleotide microarray for global gene expression profiling in guinea pigs: defining the transcription signature of infectious diseases. *BMC genomics*, *13*(1), 520. **[I.F.4.397]**
33. Saini, V., Raghuvanshi, S., Khurana, J. P., Ahmed, N., Hasnain, S. E., **Tyagi, A.K.,** & Tyagi, A. K. (2012). Massive gene acquisitions in Mycobacterium indicus pranii provide a perspective on mycobacterial evolution. *Nucleic acids research*, *40*(21), 10832-10850. **[I.F. 8.278]**
34. Sreejith, R., Rana, J., Dudha, N., Kumar, K., Gabrani, R., Sharma, S.K., Gupta, A., Vrati, S., **Chaudhary, V.K.,** & Gupta, S. (2012). "Mapping interactions of Chikungunya virus nonstructural proteins". Virus Research 169, 231–236. **[I.F. : 2016: 2.628]**.
35. Bhat, P., Gnanasundram, S.V., Mani, P., **Sarkar, D.P.** & Das, S. (2012). Targeting ribosome assembly on the HCV RNA using a small RNA molecule. RNA Biology, 9, 1-10. **[IF: 5.5]**.
36. Surolia, R., & **Ghosh, P.C.** (2012). Preparation and characterization of monensin loaded PLGA nanoparticles: in vitro anti-malarial activity against Plasmodium falciparum. Journal of Biomedical Nanotechnology. 8, 1-10. **[I.F. : 7.5].**

Our Office Staff at present. **From left to right** ***:(seating)*** *Mr. Rajiv Chawla, Mr. Baba Nand* ***(standing)*** *Mr. Mahendra Khanduri, Mr. Rameshwar Mahto, Mr. Ravi Sharma, Mr. Ramesh C. Pandey, Mr. Varun Sachdeva and Mr. Subrata Ghosh*

All administrative work and grant related matters are managed by our very efficient office staff.

Research Grants: Extramural Funding

The department qualified for the FIST (level I) support by DST (2003-2008).

The Department has been endowed with the Special Assistance Programme grant by UGC (2009-2014, DRS Phase I and 2016-2021, DRS Phase II) to strengthen research/teaching with the focus on "Development of Molecular Strategies to Combat Various Human Diseases".

SUMMARY OF EXTRAMURAL FUNDING FOR FACULTIES (2012-2017)

No. of Grants received : 16
Quantum of grants received : Rs. 80,505,2016

SUMMARY OF EXTRAMURAL FUNDING FOR THE DEPARTMENT

Quantum of grants received : Rs.14,96,4936 (UGC-SAP);
Rs.56.92 lacs (DST-FIST)

Patents

- "Mutants of Mycobacteria and process thereof", Anil K. Tyagi, Ramandeep Singh, Vivek Rao, Vadakkuppattu Devasenapathi Ramanathan, Chinnambedu Nainarappan Paramasivan, Paranji Ramaiyengar Narayanan, Yogendra Singh, Patent No. 259594, National, Indian patent Application No. 882/DEL/2003 Dated 09.07.2003 (Patent granted on 19th March 2014).
- "Mutants of Mycobacteria and process thereof", Anil K. Tyagi, Ramandeep Singh, Vivek Rao, Vadakkuppattu Devasenapathi Ramanathan, Chinnambedu Nainarappan Paramasivan, Paranji Ramaiyengar Narayanan, Yogendra Singh, Patent No.7,943,361, International (USA), Application No.10/560,605, Date of Application: July 9, 2004, Date of grant: May 17, 2011.
- "Process for producing modified reconstituted Sendai viral envelope specific for drug and/or gene delivery to liver cells", Sarkar, Debi P. Verma Santosh K., Krishnan Anuja, Sharma N.R., PCT No. PCT/IN2006/000061, International, 2010.
- "Alpha-crystallin based immunization against Mycobacterium and methods thereof", Anil K. Tyagi, Bappaditya Dey, Ruchi Jain, Aparna Khera, Vadakkuppattu Devasenapathi Ramanathan, Umesh Datta Gupta, Vishwamohan Katoch, Under consideration, National, Application No. 473/DEL/2009 dated March 9, 2009.
- "Recombinant BCG-Ag85C based immunization against tuberculosis", Anil K. Tyagi, Ruchi Jain, Bappaditya Dey, Neeraj Dhar, Vivek Rao, Ramandeep Singh, Vadakkuppatu Devasenapathi Ramanathan, Umesh Datta Gupta, Vishwamohan Katoch, Under consideration, National, Application No.2639/DEL/2008 Dated November 21, 2008.
- "Lambda phage display system and the process", Vijay K. Chaudhary, Amita Gupta, Sankar Adhya, Ira H. Pastan, US 7,410,801, August 12, 2008.
- "Isolated Polynucleotide Molecules Corresponding to Mutant and Wild-type Alleles of the Maize D9 Gene and Methods of Use", Lawit, Shai J.; Kundu, Suman; Rao, Aragula, G.; Tomes, Dwight T., US Patent 7,557,266; EP Patent 2,251,349; WO Patent 2,007,124, 312, International, 2007.
- "A simple and fast process for evaluating *Mycobacterium tuberculosis* promoters and the effect of candidate antimycobacterial compounds on promoter activity and bacterial viability under hypoxic and aerobic conditions using *M. smegmatis* as a surrogate host", Jaya Sivaswami Tyagi, Gargi Bagchi, Mayuri, Neetu Kumra, Kohinoor Kaur, Deepak Kumar Saini, Anil Kumar Tyagi, Patent No.211217, National, Application No. 981/DEL/2003
- "A process for the isolation and purification of protein p17 of HIV-1 subtype C". Vijay K. Chaudhary (No.808/Del/2003).
- "A process for the isolation and purification of protein p24 of HIV-1 subtype C". Vijay K. Chaudhary (No. 1478/Del/99).
- "Process for Producing A Targeted Gene", Sarkar, Debi P. Ramani, Komal, Bora, Roop S., Kumar, Mukesh, and Tyagi, Sandeep K., 5,683,866, International, 1997.
- "Monoclonal Antibodies (MAbs) against two coat proteins gIIIp and gVIIIp of filamentous phage M13 and a process for their preparation". Vijay K. Chaudhary. Patent No.764/Del/94, dated 20th October 1997.

Significant achievements / Awards received by students

Doctoral / Post-Doctoral Fellows

- Simran Kaur, Anshoo Gautam, Alo Nag and Kulbhushan Sharma, 2017, National, Best poster award (First prize) in Women Ph.D. category.The Protective Role of Immunomodulatory Cytokines against Lethal Dose of Radiation *in vitro* and *in vivo*. 86th Annual Conference of Society of Biological Chemists (SBC-2017) on 'Emerging Discoveries in Health and Agricultural Sciences', 16th-19th November, 2017, JNU, New Delhi, India.
- Yama Atri, Rince John and Alo Nag, 2017, National, Third best poster presentation award in Women Ph.D. category. Role of Skp2-Cytoglobin Axis in Cell Cycle Control. 86th Annual Conference of Society of Biological Chemists (SBC-2017) on 'Emerging Discoveries in Health and Agricultural Sciences', 16th-19th November, 2017, JNU, New Delhi, India.
- Pradeep Singh Cheema, 2017, Local / University, Third Best Oral Presentation Award. Identification of novel small molecule inhibitors against FoxM1 with implications in cancer therapy. 7th National Science Day Symposium, 28th February 2017, University of Delhi South Campus, New Delhi.
- Sanjay Kumar Dey, 2017, National, Poster Presentation Award for Sanjay Kumar Dey, in Indian Biophysical Society Annual Meeting, at IISER Mohali, March 23-25, 2017.
- Sanjay Kumar Dey, 2017, National, Travel award for attending Indian Biophysical Society Annual Meeting, at IISER Mohali, March 23-25, 2017.
- RichaArya, 2017, National, Travel award for attending Indian Biophysical Society Annual Meeting, at IISER Mohali, March 23-25, 2017.
- Md. Asim Khan, 2017, National, Travel award for attending Indian Biophysical Society Annual Meeting, at IISER Mohali, March 23-25, 2017.
- Richa Arya, 2017, International, Oral Presentation Award (2nd) in Indo-US conference on “Advances in Enzymology: Implications in Health, Disease and Therapeutics”, ACTREC, Mumbai, Jan 17-19, 2017.
- Manendra Pachauri and P.C. Ghosh, 2016, International, Prof. A. R. Rao Researcher Award for the best oral presentation at International Symposium on "Role of Herbals in Cancer Prevention and Treatment" at School of Life Sciences, Jawaharlal Nehru University, New Delhi, India, dated 9th-10th February 2016.
- Vinoth Rajendran, Mohsin Raza and P.C. Ghosh, 2016, Local / University, Second Oral Presentation Award. Liposome mediated delivery of anti-malarial drugs for the treatment of malaria 6th National Science Day Symposium, 29th February 2016, University of Delhi South Campus, New Delhi.
- Yama Atri, 2016, International, Best Essay Award, on 'Cancer Genomics: An Approach to Personalized Therapy' in IACR-ACOS International Conference, 8-10 April, 2016, New Delhi.
- Sanjay Kumar Dey, 2015, International, BoehringerIngelheimFonds (BIF) Travel Grant Awardfor Short Term Research Work in Germany
- Swati Singh, Garima Khare and Anil K. Tyagi, 2015, Local / University,Best Poster Award. Identification of biotin biosynthesis inhibitors for inhibition

of *Mycobacterium tuberculosis*. 5th National Science Day Symposium, 27th-28th February, 2015, University of Delhi South Campus, New Delhi.

- Sanjay Kumar Dey, 2015, National, Travel Grant from ICMR, DST and Immunology Foundation toattend Conference on Hypertension by Council of Hypertension and American Heart Association, USA, 2015.
- Sanjay Kumar Dey, 2015, International, Young Scientist Fellow, American Heart Association.
- Neha Jaiswal, Pradeep Singh Cheema, Rince John, Vaibhav Chand and Alo Nag, 2015, National, Best Poster Award. Viraloncoprotein HPV16E7 perturbs SUMOylation of FoxM1 to induce oncogenesis, International Symposium on Current Advances in Radiobiology, Stem Cells and Cancer Research, 19th-21st Feb, 2015, JNU, New Delhi.
- Sanjay Kumar Dey,Toyanji Joseph, Santosh Kumar, A. Kamaladevi, Nabanita Sarkar, Surajit Sarkar, K. Balamurugan, B.K. Thelma and Suman Kundu, 2015, National, Best Poster Award.Experimental validation of new inhibitors identified through rational structure based design against Dopamine-β-hydroxylase to combat cardiovascular diseases, Cardiovascular Research Convergence 2,17th January, 2015, All India Institute of Medical Sciences, New Delhi, India.
- Richa Arya, 2015, Local / University, Third Best Oral Presentation Award. Insight into ACP-PPTase interaction essential for Fatty acid synthesis in Leishmania major with application in drug design. 5th National Science Day Symposium, 27th-28th February, 2015, University of Delhi South Campus, New Delhi.
- Sanjay Kumar Dey, Himanshu Meghwani, Pankaj Prabhakar, Subir Kumar Maulik and Suman Kundu, 2015, International, Selected among the best five posters and for Oral presentation. Dopamine-β-hydroxylase inhibitor UDSC171 can prevent isoproterenol induced cardiac hypertrophy in rats. 12th Annual Conference of International Society for Heart Research (Indian Section), 14th-15th March, 2015, Jawaharlal Nehru University, New Delhi, India
- Garima Khare, Prachi Nangpal, Anil K. Tyagi, 2014, National, Best Poster Award. *Mycobacterium tuberculosis* bacterioferritins-Structural and biochemical characterization to facilitate rational drug design. Presented at National Symposium on “Innovation in TB Diagnostics, Drug Targets and Biomarkers”, held at Mahatma Gandhi Institute of Medical Sciences, Sevagram, 27-29th Jan 2014.
- Vinoth Rajendran, Mohsin Raza, Shilpa Rohra and Prahlad C. Ghosh, 2014, International, Best Poster Award. Evaluation of liposomal monensin in combination with artemisinin on growth inhibition of blood stages of *Plasmodium falciparum* (3D7) *in vitro*. International conference on “Emerging trends of Nanotechnology in drug discovery”, held at University of Delhi South Campus. 26-27 May.
- Vinoth Rajendran, Manendra Pachauri, Mohsin Raza, 2014, National, Travel fellowship award to the team. Selected for Biotechnology Entrepreneurship student team at “ABLE-BEST INDIA 2014”, held at Fortune Select Trinity Hotel, Bangalore. 13-17 October.
- Neha Jaiswal, 2014, International, Young Scientist Travel Award by DST and ICMR, Govt. of India for 4th World Congress on Cancer Science and Therapy, Chicago, USA, 20-22 October, 2014.
- Neha Jaiswal, 2014, International, Selected for Oral Presentation in Young Scientist Forum. Modulation of FoxM1b SUMOylation by High-Risk HPV and its significance in

cervical cancer. 4th World Congress on Cancer Science and Therapy, Chicago, USA, 20-22 October, 2014.

- Amit Kumar, Suneel Kateriya, Suman Kundu, 2014, International, Selected for Oral presentation. Hemoglobins from extremophilic and mesophilic algae: a comparative study, XVIII International Conference on Oxygen-binding and sensing proteins, 6th-10th July, 2014, University of Sheffield, Sheffield, United Kingdom.
- Akshay Rohilla, 2014, International, Best Poster Award. Disruption of mycobactin biosynthesis leads to attenuation of *Mycobacterium tuberculosis* for growth and virulence, International Conference on Recent advances in Structural Biology and Drug discovery, IIT Roorkee, 9th-11th October, 2014
- Peeyush Ranjan, Mayanka Awasthi and Suneel Kateriya, 2013, Local / University, Third Best Poster Award Microalga:mimicking the mammalian like IFT mediated trafficking of rhodopsin, National Science Day Symposium, University of Delhi South Campus, 28th February 2013, New Delhi
- Priyanka Chauhan, 2013, Local / University, Best Oral Presentation Award. Mycobactin biosynthesis is essential for the growth and virulence of Mycobacterium tuberculosis: An attractive target for therapeutic interventions. National Science Day Symposium, 28th February 2013, held at University of Delhi South Campus.
- Ritika Kar, Priyanka Chauhan, Garima Khare, Prachi Nangpal, Anil K. Tyagi, 2013, Local / University, Best Poster Award. rBCG85C – A Superior Vaccine than BCG: Modifications for Human Clinical Trials. National Science Day Symposium, 28th February 2013, held at University of Delhi South Campus.
- Sanjay Kumar Dey, B.K. Thelma and Suman Kundu, 2013, National, Third Best Poster award.Dopamine-β-hydroxylase as a novel drug targetfor cardiovascular diseases: In silico identification and in vitro validation of novel inhibitors. Conference on Recent Advances in Computational Drug Design, Indian Institute of Science, Bangalore, 16-17 September, 2013.
- Peeyush Ranjan, Mayanka Awasthi, Sindhu Kandoth Veetil and Suneel Kateriya, 2013, International, Junior Scientist Award.Cellular trafficking of phototropin and novel modular rhodopsin is mediated by animal like IFT machinery in Chlamydomonasre inhardtii, 7th Annual Convention of ABAP &International Conference on Plant Biotechnology, Molecular Medicine & Human Health, New Delhi, India, October 18th-20th, 2013.
- Sanjay Kumar Dey, 2013, National, RatnaPhadke Young Scientist Award (Oral). Identification of Novel Inhibitors against Human Dopamine-β-Hydroxylase, a Drug Target for Cardiovascular Diseases. National Symposium on Frontiers of Biophysics, Biotechnology and Bioinformatics and 37th Annual Meeting of Indian Biophysical Society (IBS), University of Mumbai, Kalina Campus, Mumbai, India, 13-16 January, 2013.
- Sanjay Kumar Dey, Abhishika Srivastava, Rachana Muley, B.K. Thelma and Suman Kundu, 2013, National, Best Poster Award. In silico identification and *in vitro* validation of novel inhibitors to combat cardiovascular diseases exploiting dopamine-β-hydroxylase as the drug target. SYSCON-2013 on Interfacing Basic and Translational Research, All India Institute of Medical Sciences, New Delhi, India, 23 August, 2013.
- Manish Shandilya, Ridhima Gomkale, Suneel Kateriya and Suman Kundu, 2013, National, Selected for Oral presentation. An insight into function of novel globins:

Characterization of hemoglobins and their reductase partners from Chlamydomonasre inhardti, National Conference on Recent Trends in Structural Biology, 16th-18th December 2013, Jamia Millia Islamia, New Delhi, India.

- Amit Kumar, 2013, National, Oral Presentation Award. Novel hemoglobins from plant and algae: Discovery to application, Biospark, School of Lifesciences, Jawaharlal Nehru University, February 16th, 2013.
- Amit Kumar, Manish Shandilya, Rudra Kashyap, Usha Yadav, V.A. Semionkin, M. I. Oshtrakh, Suneel Kateriya, Suman Kundu, 2013, International, Poster Travel Award. Discovery to applications: Snapshots of a globin journey. International Conference on Biomolecular Forms and Functions, A Celebration of 50 Years of the Ramachandran Map, Indian Institute of Sciences, Bangalore, January 8th -11th , 2013.
- Garima Khare, 2012, National, Best Oral Presentation Award. Determination of the structure of Thiamin Phosphate Synthase (MtTPS) of Mycobacterium tuberculosis by homology modeling and identification of inhibitors by using virtual screening. Young Scientist Oral presentation at Symposium on "Microbes in Health and Agriculture", 2012, held at Jawaharlal Nehru University, Delhi.
- Manendra Pachauri and Prahlad C. Ghosh, 2012, International, Award of Excellence.Combination of Curcumin and Monensin Loaded Poly(lactic-co-glycolic acid) Nanoparticles for Cancer Therapy. 3rd International Conference of Carcinogenesis Foundation-Frontiers in Carcinogenesis and Preventive Oncology Molecular Mechanisms to Therapeutics, New Delhi, India, 19-21 November,2012.
- Vaibhav Chand, Rince John, Neha Jaiswal, Vandana and Alo Nag, 2012, International, Oral presentation and Excellence Award. Downregulation of hADA3 Promotes Epithelial to Mesenchymal Transition in Cervical Cancer, 3rd International Conference of Carcinogenesis Foundation- Frontiers in Carcinogenesis and Preventive Oncology Molecular Mechanisms to Therapeutics, RML Hospital, New Delhi India, 19-21 November, 2012
- Neha Jaiswal, Rince John, Vaibhav Chand and Alo Nag, 2012, International, Oral presentation and Excellence Award. FoxM1: A Key Player in HPV-Mediated Oncogenesis, 3rd International Conference of the Carcinogenesis Foundation - Frontiers in Carcinogenesis and Preventive Oncology : Molecular Mechanisms to Therapeutics, RML hospital, New-Delhi, India, 19-21 November, 2012.
- Amit Kumar, 2012, International, BoehringerIngelheimFonds Travel Fellowship for visit to Ural Federal State University, Russia for 3 months (Oct-Dec) for research work.
- Pooja Tiwari and P.C. Ghosh, 2012, International, Awarded International travel grant by ICMR, Government of India for poster presentation entitled "Stearylamine loaded PLGA nanoparticle for treatment of malaria" at International conference "Colloids and Nanomedicine 2012" in July 2012 at Amsterdam, Netherlands.

Post-Graduate Students

- Juhi Arora, 2016, National, Indian Academy of Sciences Summer Fellowship for short term research.
- Gagandeep Kaur, 2015, Local / University, Poster Prize. Targeting Cytochrome b5 reductase3 to combat cardiovascular diseases, 5th National Science Day Symposium, 27th-28th February, 2015, University of Delhi South Campus, New Delhi

- PriyankaChowdhury, 2012, National, Indian Academy of Sciences Summer Fellowship for short term research
- Pragya Sidhwani, 2012, International, Khorana Summer Program for Scholars, Indo-US Science and Technology Forum for short term research in Wisconsin, USA.

Distinguished National/International awards received by faculty

Professor Anil K. Tyagi

- 2010, J.C. Bose National Fellow, Department of Science and Technology, GOI (2010)
- 2010, Vigyan Gaurav Samman Award by UP Government. (2010)
- 2007, C.R. Krishnamurthy Memorial Oration Award by CDRI, Lucknow (2007)
- 2006, Vice President, Society of Biological Chemists (India) from 2004-2006
- 2005, Prof. S.H. Zaidi Oration Award by ITRC, Lucknow (2005)
- 1999, Ranbaxy Research Award by Ranbaxy Science Foundation (1999)
- 1999, Dr. Nitya Anand Endowment Lecture Award by INSA (1999)
- 1995, Shanti Swarup Bhatnagar Prize by CSIR (1995)
- 1993, P.S. Sarma memorial award by the Society of Biological Chemists (India) (1993)
- 1983, Dr. Kona Sampath Kumar prize by the University of Delhi (1983)
- Fellow of the National Academy of Sciences, India
- Fellow of the Indian Academy of Sciences, India
- Fellow of the Indian National Science Academy, India
- Fellow of the Society for Immunology and Immunopathology, India

Professor Vijay K. Chaudhary

- 2017, Outstanding Alumnus award of the College of Basic Sciences and Humanities by the G.B. Pant University of Agriculture and Technology, Pantnagar. (2017)
- 2015, Visitor's Award for Innovation – conferred by Hon'ble President of India at a special ceremony at Rashtrapati Bhawan on 4 February 2015.
- 2014, Biotech Product and Process Development and Commercialization Award, Department of Biotechnology, Government of India. (2014)
- 2009, Bachhawat Memorial Lecture award by National Academy of Sciences India (2009).
- 2005, WIPO (World Intellectual Property Organization, Geneva) Gold Medal for "Best Invention of the Year 2004" for inventing "On-site Detection of HIV (AIDS) (2005).
- 2004, National Research Development Corporation (NRDC, DSIR, Ministry of Science & Technology, Government of India) award of Rs.1,50,000/- for inventing "On-site Detection of HIV (AIDS)" (2004).
- 2002, Biotech Product and Process Development and Commercialization Award, Department of Biotechnology, Government of India (2002).
- 1999, All India Biotech Association (AIBA) Award (1999).
- 1997, VASVIK Award for Biological Science and Technology (1997).
- 1991, The National Institutes of Health, USA (NIH) Director's Award (1991).
- Fellow of the National Academy of Sciences

Professor Debi P. Sarkar

- 2011, Conferred Prof. B.K. Bachhawat Memorial Lecture Award 2011 by NASI, Allahabad
- 2010, Recipient of J.C. BOSE National Fellowship (DST) Award, September, 2010
- 2005, Conferred M. Sreenivasaya Memorial Award, by SBC, India, 2005
- 1998, Awarded Shanti Swarup Bhatnagar Prize in *Biological Sciences*, 1998.
- Fellow of the National Academy of Sciences, India
- Fellow of the Indian Academy of Sciences, India
- Fellow of the Indian National Science Academy, India
- 1989, Awarded an ICRETT Fellowship by the "International Union Against Cancer" to work in NCI/NIH, USA from May 16th to August 1st, 1989.
- 1985, Awarded a Travel Fellowship by the International Union of Biochemistry to attend the 13th International Congress of Biochemistry, Amsterdam, The Netherlands, August 25th-30th, 1985.
- 1980, Awarded a Gold Medal from the Banaras Hindu University for standing first in the M.Sc. (Biochemistry) examination in 1980.

Professor Suman Kundu

- 2017, Suresh C. Tyagi Oration Award, Jan 2017, International Academy of Cardiovascular Sciences (Indian Section), National, For Accomplishments in Research and Oration in the area of cardiovascular diseases
- 2010, Indo-US Research Fellow, 2010, from Indo-US Science and Technology Forum and DST, Government of India.
- 2008, DST (Government of India) Travel Award for Attending International Conference Abroad, 2008.

Professor Alo Nag

- 2012, Appreciation award from Carcinogenesis Foundation, USA for organizing the 2012 International Carcinogenesis conference in India.
- 2012, Invited as Research Scientist Fellow in University of Illinois at Chicago, USA**,** from May to July, 2012**.**
- 2000, Travel Award by American Society for Biochemistry and Molecular Biology for attending ASBMB/ASPET 2000 Meeting, Boston, USA.
- 1997, Young Scientist travel grant awarded by Council of Scientific and Industrial Research (CSIR, India) to attend the17th International Congress of Biochemistry and Molecular Biology Conference**,** 1997, San Francisco, California.
- 1996, Young Scientist award in the 4th International Symposium on Biochemical Roles of Eukaryotic Cell Surface Macromolecules, 1996, New Delhi, India.

Dr. Amita Gupta

- 2015, Visitor's award for innovation for development of TB Confirm conferred by The President of India.

- 2010, Senior Innovative Young Biotechnologist Award (IYBA) by Department of Biotechnology, Ministry of Science and Technology, Govt. of India.
- 2007, Indian National Science Academy (INSA) Young Scientist award in Medical Sciences.
- 2007, Gordon Research Conferences Chair fellowship
- 2006, Innovative Young Biotechnologist Award (IYBA) 2005 by Department of Biotechnology, Ministry of Science and Technology, Govt. of India.
- 2005, Shakuntala Amir Chand Award-2003 of Indian Council of Medical Research (ICMR), Government of India.
- 2005, WIPO (World Intellectual Property Organization, Geneva) Gold Medal for "Best Invention of the Year 2004" for inventing "On-site Detection of HIV (AIDS).
- 2004, Prof. B.K.Bachhawat Memorial Young Scientist lecture award of The National Academy of Sciences, India.
- 2004, National Research Development Corporation (NRDC, DSIR, Ministry of Science & Technology, Government of India) award for inventing "On-site Detection of HIV(AIDS)"
- 2003, awarded Dr. D. L. Srivastava Young Scientist Award by Society of Biological Chemists (India).
- 2003, awarded Young Scientist Award (New Biology Section) by Indian Science Congress Association.
- 2001, awarded Outstanding Young Scientist Prize for the year 2001 by International Business Communications, USA.
- 1995, awarded gold medal for securing first position in Delhi University in M.Sc. (Biochemistry).

Dr. Garima Khare

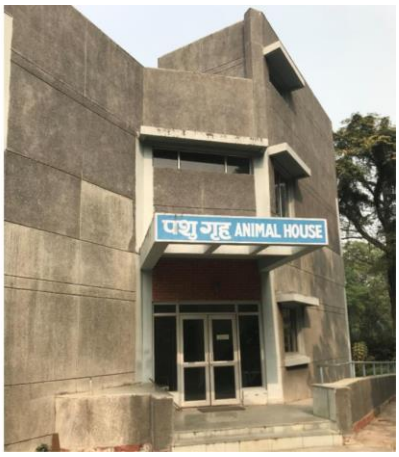
2013, Dr. Garima Khare, Indian Young Biotechnologist Award 2013, 2013, Department of Biotechnology, Government of India, Innovative research by young scientists through competitive grant writing

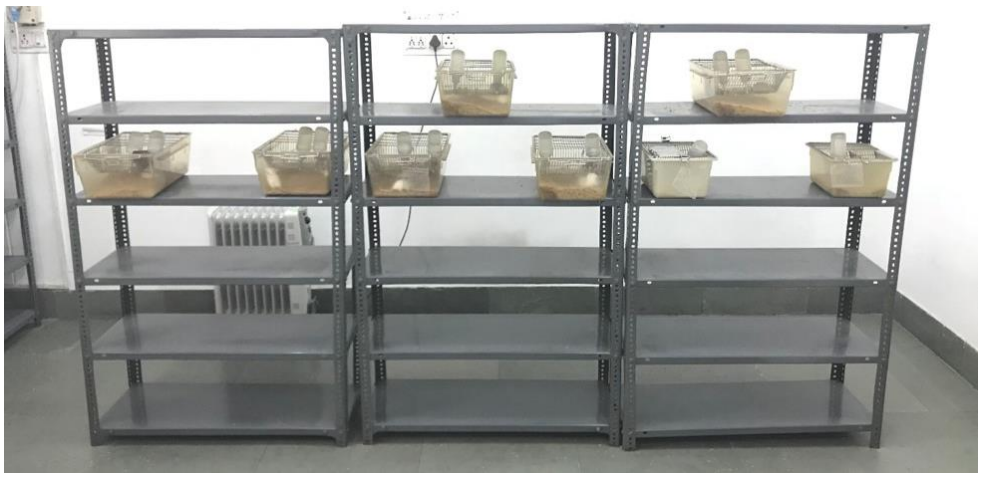
Dr. Suneel Kateriya

- 2016, Max Planck India Fellowship (2012-2016) from Department of Science and Technology, India and Max Planck Group-Germany
- 2011, Association of Microbiologist of India Young Scientist Award for 2011
- 2010, Indian Biophysical Society Ratna Phadke Young Scientist Award for 2010
- 2009, Indian Science Congress Young Scientist Award in New Biology Section for 2009

Advanced Facilities

ANIMAL HOUSE





BSL3 Facility in Animal House

*Various equipments placed in **BSL-III facility**. Two class II (Type B2) biosafety cabinets are installed in the BSL III facility. It allows 100% exhaust of the intake air. The fan in the cabinet must be kept on at the time of working in order to maintain correct airflow through the facility.*

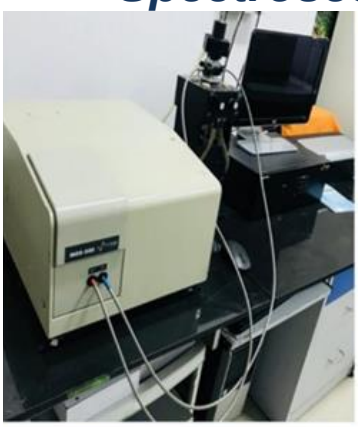
***Tissue culture facility**: One class II (Type B2) biosafety cabinets and CO_2 incubator along with other instruments like FACS calibur and Fluorescence microscope are installed in our tissue culture facility.*

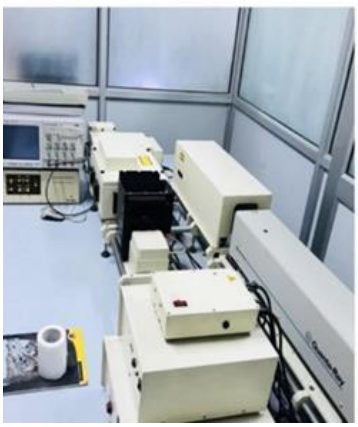
All the experimental animals are housed in individually ventilated caging system to ensure pathogen-free inner environnent.

***Aerosol Machine**: The system is a whole-body exposure chamber for the quantitative experimental infection of animals by inhalation of air bearing the pathogenic agent. The animals are placed in a compartmented mesh basket within the chamber. Compressed air and vacuum pumps, along with the necessary controls and flow indicators, are built into the system (**BSLIII Facility**).*

*Trained personnel working in **BSL III facility***

Spectroscopy Facility





1. **AKTA Explorer Protein Purification System**
2. **BIACore 3000 for Protein Interaction Studies**
3. **MiSeq Illumina Next Generation Sequencing System**
4. **Tecan Robotic Liquid Handling System with Automation for ELISA**
5. **Hybridoma Cell Culture Laboratory**
6. **DBT-supported National DNA Sequencing Facility (ABI 3730 XL, 96-Capillary and ABI 3710 XL, 96-Capillary Sequencers)**
7. **Research Scholars in Discussion**

Symposium organized by the Department

UGC-SAP 2018

YOGA DAY

70th Independence Day Celebration :
Azadi 70 Saal – Bharat Bemisal

Departmental Cricket Match

Departmental Excursion

Educational Trip

IISER Mohali, 2017

IMTech, Chandigarh, 2017

Significant Contributions of the Department: A Summary

(1) **Liposomal Amphotericin B** - commercialized by Life Care Innovations, Gurgaon.

(2) **Monoclonal antibodies to M13 phage protein** - commercialized by M/s Pharmacia (now GE HealthCare), 1998 **($20,000 received for technology transfer**).

(3) **Rapid test for HIV (AIDS)** - commercialized by M/s Cadilla Pharmaceuticals Limited, Ahmedabad, 1998-2001 (**Rs.30 lacs received for technology transfer**)

(4) **Detection of *M. tuberculosis* in culture** - transferred to M/s SPAN Diagnostics Limited, Surat (2011-17; now Arkray Health Care Pvt. Ltd.) and is likely to be available in the market shortly as the product has received approval from Drug Controller General of India (**Rs.20 lacs received for technology transfer**).

(5) **Virosome Technology for targeted delivery** – transferred to Pancea Biotech. India, New Delhi, 2004 (**Rs.17.5 lacs received for technology transfer**).

(6) **Three of the vaccine regimens against Tuberculosis** in principal have been approved for clinical trials by Tuberculosis vaccine clinical trials expert group of the Department of Biotechnology Govt. of India. The pre-clinical studies for humanization of these regimens are in progress.

(7) The department has also taken lead in **whole genome sequencing of indigenous pathogens** like *Mycobacterium indicus pranii*, which has opened up new horizon in understanding the evolution of pathogenesis in mycobacterial species and leprosy. It represented the first completed genome of a new species of bacteria published from India.

Additionally, there are many **leads in the area of vaccine and drug development**, gene and drug delivery and diagnostics especially in relation to diseases like tuberculosis, malaria, jaundice/ hepatitis, cancer and cardiovascular diseases.

Many of the faculty members are working in close collaboration with industry or institutions, which are responsible for taking leads to the next level in the process of products development. Several research initiatives in mechanistic understanding of pathogenesis, host virus membrane fusion, liposomal and nanomaterial formulation, oncogenesis, amyloidosis and artificial blood substitutes and others are ongoing.

Diagnostic kits developed by the department

NEVA HIV: A Whole-Blood Agglutination Assay for On-Site Detection of Human Immunodeficiency Virus Infection (AIDS)

NEVA HIV or Naked Eye Visible Agglutination Assay for HIV, requires bifunctional molecules comprising of monovalent antibody fragments against human RBC surface fused to peptides/proteins derived from immunodominant regions of HIV-1 and HIV-2. The molecules (monovalent anti-RBC-HIV peptide fusion proteins), upon addition to a drop of whole blood will coat the RBCs present in blood.

If anti-HIV antibodies are present in the blood (as in the case of HIV infected individual), they will bind to the HIV-derived peptide moiety of the fusion protein coating the RBCs and cause crosslinking of RBCs, resulting in visible agglutination.

No agglutination would occur in absence of anti-HIV antibodies in the blood sample, as in the case of HIV negative sample

The technology was developed at the University of Delhi South Campus under a Department of Biotechnology (Govt. of India)-funded program. This technology was transferred to Cadila Pharmaceuticals Ltd., Ahmedabad, who marketed the kit under the trade name 'NEVA HIV'.

TBconfirm

A Rapid Visual Test for detection of Tuberculosis causing bacteria in culture.

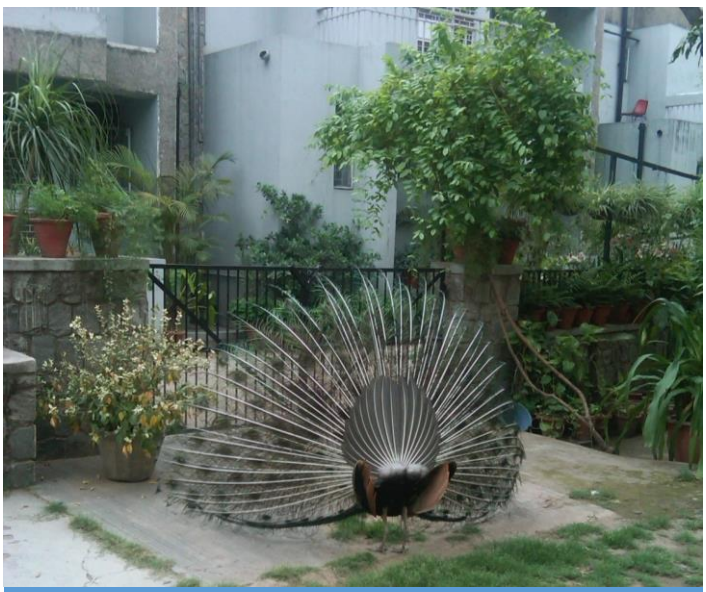
Label the Test Device. Add 1 drop of sample to the sample area S followed by 3 drops of Reaction buffer. Appearance of line at T1 and/or T2 within 20 minutes indicates presence of tuberculosis causing bacterium *M. tuberculosis* in the sample.

Manufactured by M/s Span Diagnostics Ltd, Surat using technology developed by University of Delhi South Campus under a Department of Biotechnology (Govt. of India)-funded program.

The research group led by Professor Vijay Chaudhary and Dr Amita Gupta at University of Delhi South Campus (UDSC) has developed a rapid test in Immuno-chromatographic format that allows for easy and rapid screening of specimen for confirmation of growth of tuberculosis causing bacterium *Mycobacterium tuberculosis* (Mtb). This test can be performed with minimal training and provides results in less than twenty minutes

The test is based on detection of two Mtb-specific proteins (Mtb-specific antigens), which are secreted only by growing cultures of *Mycobacterium tuberculosis*, and can be detected by high affinity monoclonal antibody pairs in a rapid format. The presence of both or any one of the Mtb-specific antigen in the sample confirms the presence of Mtb.

It has been evaluated on a large number of clinical specimen with near 100% sensitivity and 100% specificity with both specimen grown in liquid medium and LJ slant (in comparison to biochemical and nucleic acid based tests).



Spread Your Wings!!