

**NAAC**

**EVALUATIVE REPORT**

**OF**

**DEPARTMENT OF**

**BIOCHEMISTRY**

**2014**



**UNIVERSITY OF DELHI**

## Evaluative Report

### Department of Biochemistry

1. **Name of the Department** : Biochemistry
2. **Year of establishment** : 1984
3. **Is the Department part of a School/ Faculty of the University?** : Faculty of Interdisciplinary & Applied Sciences (FIAS)
4. **Names of programmes offered (UG, PG, M.Phil., Ph.D., Integrated Masters; Integrated Ph.D., D.Sc., D.Litt., etc.)**

PG Programme - M.Sc. Biochemistry  
M.Phil. (Biotechnology)  
In collaboration with other departments of FIAS

Doctoral Programme - Ph.D. Biochemistry

5. **Interdisciplinary programmes and departments involved:**

- i) **The teachers from the department are involved in teaching the following interdisciplinary courses to M.Sc. students of other departments;**

| S. No. | Interdisciplinary Paper                      | Other Department involved                                    |
|--------|--|--|
| 1.     | Protein – Structure, folding and engineering | Department of Plant Molecular Biology & Biotechnology (PMBB) |
| 2.     | Enzyme and Techniques in Biochemistry        | Department of Microbiology                                   |

- ii) **The teachers from the department are also involved in teaching course to Ph.D./M.Phil students of other departments**

| S. No. | Name of the Course | Department involved  |
|--------|--------------------|--|
| 1.     | Ph.D./M.Phil.      | Department of Plant Molecular Biology & Biotechnology (PMBB)<br>Department of Genetics<br>Department of Microbiology<br>Department of Biophysics |

6. **Courses in collaboration with other Universities, industries, foreign institutions etc.** : None
7. **Details of programmes discontinued, if any, with reasons** : None

**8. Examination System: Annual/Semester/Trimester/Choice Based Credit System –**

| S. No. | Name of the Course      | Type of Examination           |
|--------|-------------------------|-------------------------------|
| 1.     | M.Sc. Biochemistry      | Semester System               |
| 2.     | M.Phil. (Biotechnology) | Semester System               |
| 3.     | Ph.D. (Biochemistry)    | Course work – Semester system |

**9. Participation of the department in the courses offered by other departments:-**

- i) **The M.Sc. students from the Department of Biochemistry take the following interdisciplinary courses offered by the other Departments:**

| S. No. | Name of the Paper              | Name of the Dept. teaching the course                         |
|--------|--------------------------------|---|
| 1.     | Microbial Pathogenicity        | Department of Microbiology                                    |
| 2.     | Introduction to Bioinformatics | Department of Plant Molecular Biology & Biotechnology (PMBB). |

- ii) **The Ph.D./M.Phil students from the Department of Biochemistry take up courses in other Departments viz. PMBB, Microbiology and Biophysics**

| S. No. | Name of the Paper                | Name of the Dept. teaching the course                        |
|--------|----------------------------------|--|
| 1.     | Microbial Pathogenicity          | Department of Microbiology                                   |
| 2.     | Introduction to Bioinformatics   | Department of Plant Molecular Biology & Biotechnology (PMBB) |
| 3.     | Immunology                       | Department of Microbiology                                   |
| 4.     | Computer Applications in Biology | Department of Biophysics                                     |

**10. Number of teaching posts sanctioned, filled and actual (Professors/ Associate Professors/Asst. Professors/others)**

|                      | Sanctioned | Filled | Actual (including CAS & MPS) |
|----------------------|------------|--------|------------------------------|
| Professor            | 03         | 03     | 06                           |
| Associate Professors | 04         | 01     | 01                           |
| Asst. Professors     | 03         | 02     | 02                           |

**11. Faculty profile with name, qualification, designation, area of specialization, experience and research under guidance**

| Name                | Qualification | Designation | Specialization                             | No. of Years of Experience | No. of Ph.D./M.Phil. students guided for the last 4 years |
|---------------------|---------------|-------------|--|----------------------------|---|
| Prof. Anil K. Tyagi | M.Sc., Ph.D.  | Professor   | Tuberculosis with special reference to the | 34 Years                   | 5 awarded<br>6 continuing                                 |

|                          |              |                     |  |          |  |
|--------------------------|--------------|---------------------|--|----------|--|
|                          |              |                     | development of new TB vaccines and drug discovery against TB   |          |  |
| Prof. Vijay K. Chaudhary | M.Sc., Ph.D. | Professor           | Development of novel reagents for diagnostic test for infectious diseases using state-of-the-art protein engineering technologies including human antibodies.                                    | 28 Years | 2 awarded<br>5 continuing<br>(1 submitted) |
| Prof. Prahlad C. Ghosh   | M.Sc., Ph.D. | Professor           | Drug Delivery using Liposomes and Nanoparticles as Carriers.   | 28 Years | 4 awarded<br>6 continuing                  |
| Prof. Debi P. Sarkar     | M.Sc., Ph.D. | Professor           | HOST-VIRUS Interactions/Molecular Cell Biology/Virology  | 26 Years | 4 awarded<br>1 continuing<br>(2 submitted) |
| Prof. Suman Kundu        | M.Sc., Ph.D. | Professor           | Structure-Function Relationship and Protein Engineering in Hemoglobins and Artificial Blood Substitutes; Diagnosis of Hemoglobinopathies; Rational Drug Design (Cardiovascular Diseases, Cancer) | 8 Years  | 3 awarded<br>3 continuing<br>(1 submitted) |
| Prof. Alo Nag            | M.Sc., Ph.D. | Professor           | Molecular mechanisms of cellular transformation during oncogenesis and discovery of novel therapeutic targets against cancer.  | 7 Years  | 2 continuing<br>(2 submitted)              |
| Dr. Amita Gupta          | M.Sc., Ph.D. | Associate Professor | Deciphering the role of TA loci in M. tuberculosis; development of expression systems for functional genomics  | 8 Years  | 1 awarded<br>2 continuing                  |

|                     |              |                     |  |                             |                            |
|---------------------|--------------|---------------------|--|-----------------------------|----------------------------|
| Dr. Suneel Kateriya | M.Sc., Ph.D. | Assistant Professor | Molecular basis of the rhodopsin mediated signaling, Optogenetics, Channelopathy and Ciliopathy      | 8 Years                     | 3 continuing (1 submitted) |
| Dr. Garima Khare    | M.Sc., Ph.D. | Assistant Professor | Drug discovery against tuberculosis and understanding the host pathogen interactions in tuberculosis | -<br>(Joined on 19.11.2014) | -                          |

12. **List of Senior Visiting Fellows, adjunct faculty, emeritus professors** : None

13. **Percentage of classes taken by temporary faculty – programme-wise information** : None

14. **Programme-wise Student Teacher Ratio:**

| S.No. | Programme          | Student Teacher Ratio |
|-------|--------------------|-----------------------|
| 1.    | M.Sc. Biochemistry | 3:1                   |
| 2.    | Ph.D. Biochemistry | 5:1                   |

15. **Number of academic support staff (technical) and administrative staff: sanctioned, filled and actual**

| Category       | Sanctioned | Filled | Actual |
|----------------|------------|--------|--------|
| Administrative | 1          | 1      | 1      |
| Technical      | 2          | 2      | 2      |
| MTS            | 1          | 1      | 1      |

*These posts have been sanctioned faculty-wise and not department-wise*

16. **Research thrust areas as recognized by major funding agencies:**

- Diagnostics, prophylactics and therapeutics for infectious diseases with emphasis on Tuberculosis
- Drug delivery using virosomes, liposomes and nanoparticles as carrier for the treatment of infectious diseases.
- Basic understanding of the molecular mechanisms of oncogenesis and discovery of novel anti-cancer therapeutic strategies.
- Photosignalling, optogenetics, channelopathies and ciliopathies
- Mechanistic understanding of novel hemoglobins, diagnostics for hemoglobinopathies and rational drug design for cardiovascular diseases and cancer

17. **Number of faculty with ongoing projects from a) national b) international funding agencies and c) Total grants received. Give the names of the funding agencies, project title and grants received project-wise.**

a) **National**

**Name of the funding Agencies:**

Department of Biotechnology (DBT), Government of India

Department of Science and Technology (DST), Government of India

University Grant Commission (UGC)

Council of Scientific and Industrial Research (CSIR)

Indian Council of Medical Research (ICMR)

**Prof. Anil K. Tyagi**

| <b>Title</b>   | <b>Funding Agency</b> | <b>Ongoing/ Sanction</b> | <b>Grant (in Lacs)</b> |
|--|-----------------------|--------------------------|------------------------|
| rBCG85C – a candidate TB vaccine: Removal of antibiotic resistance marker, modifications for stabilization of antigen expression and efficacy studies<br>(Sept. 2009 to August 2013) | DBT                   | Ongoing                  | Rs.193.90 lacs         |
| A Virtual Centre of Excellence for Co-ordinated Research on Tuberculosis :Development of Alternate Strategies<br>(September 2011 to September 2016)                                  | DBT                   | Ongoing                  | Rs.484.77 lacs         |
| Development and evaluation of an $\alpha$ -crystallin based prime boost vaccination strategy against TB by employing MVA<br>(May 2012 to November 2014)                              | DBT                   | Ongoing                  | Rs.80.89 lacs          |

**Prof. Vijay K. Chaudhary**

|  |                |         |                |
|--|----------------|---------|----------------|
| Development for reagents for simple immunochemical tests for the detection of Chikungunya infection (May, 2014- May 2017)  | DBT            | Ongoing | Rs. 86.4 lacs  |
| DNA Sequencing facility at UDSC (Phase V)<br>(June 2014- June 2017)  | DBT            | Ongoing | Rs.114.26 lacs |
| NMITLI Project "Development and production of a therapeutic monoclonal antibody against eNAMPT, a novel inflammatory target"<br>(March, 2011-2016)   | CSIR<br>NMITLI | Ongoing | Rs. 275 lacs   |
| Ready-to-use Microfluidic Cartridges for Affordable Point-of-care Diagnostics "ReDia", DBT under Indo-Finland programme.<br>(Jan 2012- September 2014)   | DBT            | Ongoing | Rs.74.23 lacs  |
| DNA Sequencing facility at UDSC (Phase IV)<br>(October 2010- March 2014)   | DBT            | Ongoing | Rs.173.94 lacs |
| Indo-Finnish collaborative project "High performing lateral-flow type assay concepts for cardiac and infectious disease testing" DBT under Indo-Finland programme.<br>(March 2010- March 2013) | DBT            | Ongoing | Rs.89 lacs     |

|   |     |         |                |
|---|-----|---------|----------------|
| “Development of reagents for simple and rapid immunochemical test for culture confirmation of <i>Mycobacterium tuberculosis</i> complex” & Multi Centre Evaluation of TBConfirm test (A rapid Immunochromatography test) for culture confirmation of <i>M. tuberculosis</i> .<br>(September 2006- March 2014) | DBT | Ongoing | Rs.268.94 lacs |
|---|-----|---------|----------------|

**Prof. Prahlad C. Ghosh**

|   |      |         |             |
|---|------|---------|-------------|
| Evaluation of Soya Phosphatidylcholine- Stearylamine Liposome as Anti-Malarial Agent. 2012 - 2015           | ICMR | Ongoing | Rs.25 lakhs |
| Biodegradable nanoparticles mediated delivery of antimalarial drugs for the treatment of malaria. 2008-2012 | DBT  | Ongoing | Rs.93 lakhs |

**Prof. Debi P. Sarkar**

|   |     |         |                |
|---|-----|---------|----------------|
| Inhibition of HCV RNA translational and replication using small RNAs wef November, 2008 in collaboration with Dr. Saumitra Das, Dept. of Microbiology and Cell Biology, Indian Institute of Science, Bangalore-560012 | DBT | Ongoing | Rs.64 Lakhs    |
| Utilization of siRNA tools to study stress-induced liver cells response using hepatocyte specific fusogenic nanoparticle derived from Sendai virus wef 2008, with Dr. Sandeep Saxena, NII, New Delhi.                 | DBT | Ongoing | Rs.97.36 Lakhs |
| Novel nanoscale materials-----antimicrobial and anticancer activities wef April 2011, with Prof. SS Ghosh, IIT, Guwahati, NE/DBT programme.   | DBT | Ongoing | Rs. 75 Lakhs   |

**Prof. Suman Kundu**

|  |              |         |                |
|--|--------------|---------|----------------|
| Structure-function relationship in Dopamine Beta hydroxylase and neuroglobin. 2008-2014  | DBT          | Ongoing | Rs.32.50 Lakhs |
| Characterizing Novel Globins Across Species and Deciphering their Stress Response and Interacting Partners: An Integrated, Holistic Approach for Function Elucidation. 2009-2013 | DU-DST Purse | Ongoing | Rs. 49 Lakhs   |

**Prof. Alo Nag**

|  |   |         |                 |
|--|---|---------|-----------------|
| Role of ADA3 in damaged DNA pathways. 2010-2013. | DST-SERC Fast Track project for Young Scientist | Ongoing | Rs. 17.48 lakhs |
|--|---|---------|-----------------|

|   |                 |         |              |
|---|-----------------|---------|--------------|
| Characterizing Novel Globins Across Species and Deciphering their Stress Response and Interacting Partners: An Integrated, Holistic Approach for Function Elucidation.<br>2009-2013 | DU-DST<br>Purse | Ongoing | Rs. 52 Lakhs |
|---|-----------------|---------|--------------|

**Dr. Suneel Kateriya**

|   |  |         |            |
|---|--|---------|------------|
| Photo-dynamic, biochemical and optogenetic characterization of the novel bacterial photoactivated Adenylatecyclase. (2013-16)   | Funded by<br>SERB-DST,<br>Govt. of India   | Ongoing | Rs.45 lacs |
| Engineering of photoactivated adenylatecyclase (PAC) for the development of optogenetic tools for neuroscience Applications. (2013-2016)  | Funded by<br>DBT, Govt.<br>of India  | Ongoing | Rs.46 lacs |
| Development of new light-sensitive protein tools for neuroscience applications<br>(2009-2013)   | Funded by<br>DBT, under<br>“Joint<br>collaborative<br>project Indo-<br>German<br>collaboration<br>in<br>biotechnology<br>scheme” | Ongoing | Rs.40 lacs |
| Biochemical and biophysical characterization of small GTPase from <i>C. reinhardtii</i><br>(2010-2013)  | Funded by<br>DST, under<br>SERC Fast<br>Track Project<br>for Young<br>Scientist  | Ongoing | Rs.20 lacs |
| Characterizing novel globins across species and deciphering their stress response and interacting Partners: An Integrated, holistic approach for function elucidation<br>(2009-2013)  | Funded by<br>DST-DU,<br>Purse Grant  | Ongoing | Rs.27 lacs |
| Development of pre-treatment strategies and bioprocess for improved production of cellulolytic enzymes and ethanol from crop byproduct for demonstration at pilot plant-<br>(2012-15) | Funded by<br>Ministry of<br>New and<br>Renewable<br>Energy, Govt.<br>of India  | Ongoing | Rs.10 lacs |

- b) **International**                      None
- c) **Total Grant Received:**      2534.67 lacs



**18. Inter-institutional collaborative projects and associated grants received**

**(a) National collaboration**

| <b>Name of the Faculty</b>      | <b>Collaborated Agency</b>   |
|---------------------------------|--|
| <b>Prof. Vijay K. Chaudhary</b> | Development for reagents for simple immunochemical tests for the detection of Chikungunya infection. ICMR Virus Research Unit, Kolkata and IIIT, Noida.  |
|                                 | Development of rapid test for infectious diseases with M/s SPAN Diagnostics Limited, Surat   |
|                                 | Development and evaluation for the development of rapid test for culture confirmation of <i>M. tuberculosis</i> with AIIMS (New Delhi), PGI (Chandigarh), P.D. Hinduja Hospital (Mumbai), Nizam Institute of Medical Sciences (Hyderabad), NJIL&OMD (Agra) |
| <b>Prof. Debi P. Sarkar</b>     | Inhibition of HCV RNA translational and replication using small RNAs” in collaboration with Dr. Saumitra Das, Dept. of Microbiology and Cell Biology, Indian Institute of Science, Bangalore-560012  |
|                                 | Role of Nonmuscle Myosin II in virus-cell fusion” with Dr. SS Jana, IACS, Kolkata.   |
|                                 | Novel nanoscale materials-----antimicrobial and anticancer activities” with Prof. SS Ghosh, IIT, Guwahati.   |
| <b>Dr. Suneel Kateriya</b>      | Engineering of photoactivated adenylatecyclase (PAC) for the development of optogenetic tools for neuroscience Applications. Collaborative project with Dr. Surjit Sarkar, Department of Genetics, UDSC, New Delhi   |

**(b) International Collaboration**

| <b>Name of the Faculty</b>      | <b>Collaborated Agency</b>   |
|---------------------------------|--|
| <b>Prof. Vijay K. Chaudhary</b> | High Performing Lateral Flow ..... For Cardiac and Infectious diseases”)with University of Turku, Finland under Indo-Finland programme supported by DBT  |
|                                 | Ready-to-use Microfluidic Cartridges for Affordable Point-of-care Diagnostics “ReDia”” by Prof. Vijay. K. Chaudhary, Prof. PasiKallio, Tampere University of Technology and Department of Biotechnology, University of Turku, BioCity, Finland under Indo-Finnish collaboration in diagnostics” by Finnish Funding Agency for Technology and Innovation (TEKES), and the Indian Department of Biotechnology (DBT). |
| <b>Prof. Suman Kundu</b>        | Mossbauer Spectroscopy of Mammalian and other Novel Hemoglobins. Boehringer Ingelheim Fonds Fellowship for student and Research Collaboration with Ural State Technical University-UPI, Ekaterinburg, Russia, 2010-2015  |
| <b>Dr. Suneel Kateriya</b>      | Development of novel optogenetics tools, collaborative project with Prof. Peter Hegeman, Humboldt University, Berlin, Germany  |
|                                 | Engineering and characterization of LOV domain proteins, Max-Planck Institute, Muelheim, Germany   |

**19. Departmental projects funded by DST-FIST; UGC-SAP/CAS, DPE; DBT, ICSSR, AICTE, etc.; total grants received.**

| S. No. | Projects Funding Agency | Grant Received |
|--------|-------------------------|----------------|
| 1.     | DST-FIST                | Rs.56.92 lacs  |
| 2.     | UGC-SAP                 | Rs.42.63 lacs  |

**20. Research facility / centre with**

| S. No. | Research Facility         | Centre with   |
|--------|---------------------------|---|
| 1.     | State recognition         | None  |
| 2.     | National recognition      | DBT supported DNA Sequencing Facility<br>DBT supported Distributed Information Sub-Centre |
| 3.     | International recognition | None  |

**21. Special research laboratories sponsored by / created by industry or corporate Bodies:**

The department has a **BSL3 facility** located at the campus dedicated to work related to tuberculosis. The facility has P3 level containment to work with *Mycobacterium tuberculosis* and has facilities for animal work and infection of animals with aerosol challenge. The facility was created by the Department of Biotechnology, Government of India in 2009.

**22. Publications**

| Nature of information  | Total   |
|--|---|
| Number of papers published in peer reviewed journals (national/international)  | 100 (Last 5 years: 2009-2014)                       |
| Monographs   | None  |
| Chapters in Books  | 03 (Last 5 years: 2009-2014)                        |
| Books edited   | None  |
| Books with ISBN with details of publishers   | None  |
| Number listed in International Database (For e.g. Web of Science, Scopus, Humanities International Complete, Dare Database - International Social Sciences Directory, EBSCO host, Google Scholar etc.) | 100 (Last 5 years: 2009-2014)                       |
| Citation Index – range / average   | Range: 890 – 2660<br>Average: 1341 (per faculty)    |
| SNIP   | 1.177 (70 articles)                                 |
| SJR  | 1.817 (70 articles)                                 |
| Impact Factor – range / average  | Range:0.21 – 13.217<br>Average:~ 3.53 (per journal) |
| h-index  | Range: 12 - 31<br>Average: 19 (per faculty)         |

*Details at Annexure – I. Annexures/Appendices do not form part of this document as per NAAC guidelines. It will be presented before the Peer Team on their visit to the University.*

## 23. Details of patents and income generated

### Income Generated

- Rs. 30 lacs were received from M/s Cadila Pharmaceuticals limited Ahmedabad in lieu of licensing the technology for NEVAHIV, a rapid test for HIV (AIDS), 2004 (Prof. Vijay K. Chaudhary)
- Rs. 6 lacs out of a total 20 lacs were received from M/s Span Diagnostics, Surat in lieu of licensing the technology for TBConfirm, a rapid test for confirming the presence of Mycobacterium tuberculosis in growing cultures. 2011 (Prof. Vijay K. Chaudhary)
- The Virosome technology (Sarkar, Debi P. Ramani, Komal, Bora, Roop S., Kumar, Mukesh, and Tyagi, Sandeep K. Process for Producing A Targeted Gene. US Patent Application Granted. Patent No. 5,683,866; Date. 4th Nov, 1997) has been licensed to the Panacea Biotech Ltd., New Delhi, through NRDC, NEW DELHI, MOU signed, March, 2002. Technology transfer process has been completed and Royalty (Rs. 25.00 Lakh) received by University of Delhi. As of now, commercialization is awaited (Prof. Debi P. Sarkar).

### Details of Patents

#### Prof. Anil K. Tyagi

- Title:** Mutants of mycobacteria and process thereof.  
Indian Patent Application No. 882/DEL/2003 dated 09.07.2003  
**Investigators:** Anil Tyagi *et al.*
- Title:** Mutants of mycobacteria and process thereof.  
PCT Application No. PCT/IN04/002003  
**Investigators:** Anil Tyagi *et al.*  
(*Patent granted by Singapore Patent Office, application pending in USA, Brazil and Japan*)
- Title:** Recombinant BCG-Ag85C based immunization against tuberculosis.  
Indian Patent Application No. 2639/DEL/2008 dated November 21, 2008  
**Investigators:** Anil Tyagi *et al.*
- Title:** Alpha-crystallin based immunization against *Mycobacterium* and methods thereof.  
Indian Patent Application No.473/DEL/2009 dated March 9, 2009  
**Investigators:** Anil Tyagi *et al.*
- Title:** A simple and fast process for evaluating promoter activity of persistent *M. tuberculosis* in hypoxic conditions using *M. smegmatis* as a surrogate host  
Indian Patent Application No. 981/DEL/2003  
**Investigators:** Jaya Tyagi *et al.*

#### Prof. Vijay K. Chaudhary

- Recombinant antibody-toxin fusion protein, David FitzGerald, Vijay Kumar Chaudhary, Ira Harry Pastan, Thomas Alexander Waldmann, Cary L. Queen. US Patent No.5,696, 237, December, 9, 1997.

- ii. Pseudomonas Exotoxins of Low Animal Toxicity and High Cytocidal Activity, Ira Pastan, David Fitzgerald, Vijay K. Chaudhary, US Patent No. 5,705,156, January 6, 1998.
- iii. Target-specific, Cytotoxic, Recombinant Pseudomonas Exotoxin, Ira Pastan, Vijay K. Chaudhary, David Fitzgerald, US Patent No.5,705,163, January 6, 1998.
- iv. Monoclonal Antibodies(MAbs) against two coat proteins gIIIp and gVIIIp of filamentous phage M13 and a process for their preparation. Patent No.764/Del/94, dated 20 October, 1997. (This technology was licensed to Pharmacia Biotech. Inc., USA.)
- v. Cytotoxic agent against specific virus infection, Patent No.5,587,455
- vi. Pseudomonas exotoxins (PE) and conjugates there of having lower animal toxicity with high cytotoxic activity through substitution of positively charged amino acids. US Patent No.5, 512, 658
- vii. Pseudomonas exotoxin fusion proteins have COOHG220101 al alterations, which increase cytotoxicity. US Patent No.5, 458, 143.
- viii. Cytotoxic agent against specific virus infection. US Patent No.5, 428, 143
- ix. CD-4/cytotoxic gene fusions. US Patent No.5, 206, 353.
- x. A process for the isolation and purification of protein p17 of HIV-1 subtype B and C. (application no.1476/Del/99) (M/s SPAN has shown interest to licence the technology)
- xi. A process for the isolation and purification of protein p24 of HIV-1 subtype B. (application no.1477/Del/99) (M/s SPAN has shown interest to licence the technology)
- xii. A process for the isolation and purification of protein p24 of HIV-1 subtype C. (application no.1478/Del/99) (M/s SPAN has shown interest to licence the technology)
- xiii. Recombinant fusion proteins, a process for preparing the same and their use in an agglutination based assay for the detection of anti-HIV antibodies (application no.659/Del/2001). (This technology was licensed to Cadila Pharmaceuticals, India who commercialized it as NEVA HIV.)
- xiv. A non-aggregating derivative of HIV-1 p24 for haemagglutination based rapid detection of antibodies to HIV in whole blood (application no.1149/Del/2001).
- xv. A process of displaying functional proteins on Bacteriophage Lambda. (No. 566/Del/2002)
- xvi. A process for the isolation and purification of protein p17 of HIV-1 subtype C. (No.808/Del/2003) (M/s SPAN has shown interest to licence the technology)
- xvii. A process of obtaining recombinant lambdaoid bacteriophage and the resultant novel phage display system (No: PCT/IN03/00193; 18th Nov 2004, WO03/096969)
- xviii. A process for preparation of an agglutination reagent for rapid detection of typhoid. GP Rai, GS Agarwal, SK Sharma, DK Jaiswal, K Shekhar, K Arora, & Chaudhary, Vijay Kumar WO Patent 2,004,047,721.
- xix. Process for preparation of an agglutination reagent for rapid detection of typhoid. GP Rai, GS Agarwal, SK Sharma, DK Jaiswal, K Shekhar, K Arora, & Chaudhary, Vijay Kumar US20060127960 (2006)

- xx. A process for preparation of an agglutination reagent for rapid detection of typhoid. GP Rai, GS Agarwal, SK Sharma, DK Jaiswal, K Shekhar, K Arora, & Chaudhary, Vijay Kumar EP Patent 1,575,520. (2007)
- xxi. Lambda Phage display system and the process (US patent No. 7,410,801 August 2008)
- xxii. Improved process for expression, purification and enhanced recovery of mycobacterial recombinant proteins. (Application no. 2077/Del/2004)
- xxiii. A process of producing ORF-enriched phage display library and uses thereof. (Application no. 2346/Del/2013)
- xxiv. Improved process for expression, purification and enhanced recovery of mycobacterial recombinant proteins. Indian Patent No IN263766 (2077/DEL/2004) awarded on 17.11.2014

**Prof. Debi P. Sarkar**

- i. Sarkar, Debi P. Ramani, Komal, Bora, Roop S., Kumar, Mukesh, and Tyagi, Sandeep K. Process for Producing A Targeted Gene. *US Patent Application Granted*. Patent No. 5,683,866; Date. 4th Nov, 1997.
- ii. Debi P. Sarkar *et. al.*(2005) “Process for producing modified reconstituted Sendai viral envelope specific for drug and/or gene delivery to liver cells” Indian Patent Applications Filed. #1003/Del/2005 dated 21/4/2005.PCT application filed, October 2005 (PCT No. PCT/IN2006/000061 dated 6<sup>th</sup> Nov., 2009). USA Patent Application Published, Pub. No. US 2010/0047897 A1, dated 25<sup>th</sup> Feb., 2010, Accepted/Published other countries March, 2011.

**Prof. Suman Kundu**

- i. Isolated Polynucleotide Molecules Corresponding to Mutant and Wild-type Alleles of the Maize D9 Gene and Methods of Use. (2007) Lawit, Shai J.; Kundu, Suman; Rao, Aragula, G.; Tomes, Dwight T. Affiliation: Pioneer Hi-Bred International, Inc., Johnston, Iowa, USA. (US Patent 7,557,266; EP Patent 2,251,349; WO Patent 2,007,124, 312)

**24. Areas of consultancy and income generated**

Professor Vijay K Chaudhary served as consultant to M/s Cadila Pharmaceuticals Limited, Ahmedabad from September, 2007 to October, 2010, and the University received a sum of Rs. 32 lacs, which was distributed to Professor Chaudhary as per rules.

**25. Faculty selected nationally / internationally to visit other laboratories /institutions / industries in India and abroad**

**Prof. Debi P. Sarkar**

- (a) Invited as resource person & invited speaker in Biotech 2012, 24-25<sup>th</sup> Feb. 2012 at ILBS, Vasant Kunj, New Delhi
- (b) Resource person & invited speaker in Seminar on Molecular Biology, 31<sup>st</sup> March, at Agartala Gov. Medical College

- (c) As organizer of Trends in Translational Proteomics, The Indian Proteomics Conference, 3<sup>rd</sup> to 5<sup>th</sup> April, 2011, JNU
- (d) Taught many classes in Academic Staff College, JNU from 2005 till 2011
- (e) Taken workshop classes as a visiting scientist at Albert Einstein College of Medicine, New York, USA, May, 2008 and 2011

**Prof. Suman Kundu**

- (a) Selected as Indo-US Fellow to visit Iowa State University, USA for three months in 2010.

**Prof. Alo Nag**

- (a) Invited as Research Scientist Fellow in University of Illinois at Chicago, USA, 2012

**Dr. Suneel Kateriya**

- (a) Max-Planck Institute of Chemical Energy Conversion, Muelheim, Germany
- (b) Institute of Biology, Humboldt University, Berlin, Germany

**26. Faculty serving in**

**a) National committees**

**Prof. Anil K. Tyagi**

- Member, Scientific Advisory Group, Translational Health Science and Technology Institute (THSTI), Udyog Vihar, Gurgaon from 2010 onwards.
- Member, APEX Committee, Vaccine Grant Challenge Programme, Department of Biotechnology, Government of India, New Delhi from 2011 onwards.
- Member of Scientific Advisory Committee, National Centre for Cell Sciences (NCCS), Pune, 2003 -2010.
- Member of Expert Committee for North Eastern Region Biotechnology Programmes, Department of Biotechnology, Government of India, 2009 onwards.
- Member, Technical Advisory Committee (TAC) for advising, evaluating, reviewing and monitoring activities of National Research Development Corporation (NRDC), New Delhi for activities funded by DSIR, 2007-09.
- Member, Task Force for Vaccines and Diagnostics in the areas of health care, Department of Biotechnology, Government of India, New Delhi, 2005-08.
- Member, Task Force for Infectious Disease Biology, Department of Biotechnology, Government of India, New Delhi, 2005-08.
- Member, Research Area Panels and Scientific Advisory Committee, National Institute of Immunology, New Delhi, 1996-2008.
- Member of the Research Area Panels and Scientific Advisory Committee, Centre for DNA Finger Printing and Diagnosis (CDFD), Hyderabad, 1999-2011.

- Member, Academic Committee, Translational Health Science and Technology Institute, Gurgaon from August 2013 onwards.
- Member, Academic Committee, National Institute of Immunology, New Delhi from 2013 onwards.
- Member, Academic Committee, International Centre for Genetic Engineering and Biotechnology, New Delhi, January 2008-10.
- Member, Advisory Committee of DRS Programme, Interdisciplinary Biotechnology Unit, Aligarh Muslim University, Aligarh, May 2007 to March 2012.

**Prof. Vijay K. Chaudhary**

- Member, Expert Committee on Tuberculosis, Department of Biotechnology, Government of India, New Delhi, 2006 onwards.
- Member, Task Force on DBT-Boost to University Interdisciplinary Life Sciences for Education and Research (DBT-BUILDER) Department of Biotechnology, Government of India, New Delhi, 2009 onwards.
- Member, Committee for Innovative Young Biotechnologists Award, Department of Biotechnology, Government of India, New Delhi, 2005 onwards.
- Member, Expert Committee(DBT-ICMR) on HIV, AIDS and Microbicides, Department of Biotechnology, Government of India, New Delhi, 2010 onwards.

**Prof. Debi P. Sarkar**

- Member of the Special Committee of Center for Biotechnology, JNU, New Delhi.
- Member of the Academic Committee of ICGEB, New Delhi.
- Member of the Special Committee of SLS, JNU, New Delhi.
- Member of the Task Force on Fast Track Project, DST, New Delhi.
- Member, Academic Council, Delhi University, Delhi
- Member, Task Force, RCGM, DBT, New Delhi
- Member, Task Force, Biotech Facilities and Infrastructure, DBT, New Delhi
- Member, Task Force, Basic Research in Modern Biology, DBT, New Delhi
- Member, Thematic-Group on “National S&T Human Resource Development”, CSIR, for the formulation of Eleventh Five Year Plan.
- Member, of the Academic Committee of CCMB (CSIR), Hyderabad
- Member, of the Academic Committee of IMTECH (CSIR), Chandigarh
- Member, of the RC of CIMAP (CSIR), Lucknow
- Member, Planning and Monitoring Board of National Brain Research Centre (NBRC, DBT), Manesar, Gurgaon
- Expert Member, RAB/CSIR
- Member, Standing Committee on Recognized Research Institute, JNU
- Member, Course committee, IISER, Mohali, Chandigarh
- Member of the expert committee of CSIR Eng-42 RA/SRF selection
- Co-Convenor CSIR/UGC NET Examination Board
- Expert Member of the task force of “Animal Science Committee”, CSIR
- Elected Member, NII Finance Committee
- Member Task Force of DBT, Bio-Care
- Member Task Force of IYBA, DBT
- Member Research Council, ICPO (ICMR)



**Prof. Suman Kundu**

- Special Academic Committee Member, Special Center of Molecular Medicine, JNU, 2013-2016
- Executive Council Member, Proteomics Society, India, 2014-2017

b) **International committees** : None

c) **Editorial Boards**

**Prof. Anil K. Tyagi**

- Academic Editor, PLoS ONE from 2009 onwards, published by Public Library of Science.
- Member of Editorial Advisory Board for the journal Tuberculosis from 2012 onwards published by Elsevier Press.
- Member of the Editorial Board for the Journal “Indian Journal of Medical Research” published by ICMR, New Delhi, 2003 onwards.

**Prof. Debi P. Sarkar**

- Elected member of the editorial board of Indian Journal of Biochemistry and Biophysics.
- Member, Editorial Board of “Human Gene Therapy”, MaryAnn Liebert Inc. Publishers, A Journal of European Society for Gene and Cell Therapy w.e.f. August 2009

**Prof. Suman Kundu**

- Editor-in-Chief, Journal of Proteins and Proteomics, India

**Prof. Alo Nag**

- Member of the Editorial Board for the Journal “Current Trends in Biotechnological and Chemical Research” India.
- Associate Board member, Journal of Proteins and Proteomics, India.

**Dr. Suneel Kateriya**

- Editorial Board Member, Advances in Applied Research Journal



**d) Any other**

**Prof. Anil K. Tyagi**

- Reviewer of research grant proposals for Wellcome Trust, CSIR, DBT and DST, Govt. of India.
- Regular reviewer for papers from the journals such as PLoS ONE, Indian Journal of Medical Research, Vaccine.

**Prof. Debi P. Sarkar**

- Reviewer of research grant proposals for CSIR, DBT and DST, Govt. of India.
- Reviewer of research papers from FEBS Letters, Molecular Pharmaceutics (USA), Molecular Membrane Biology (USA), BioTechniques (USA), Antiviral Research (Belgium), Archaea (Canada), PDA Journal of Pharmaceutical Science and Technology (USA), International Medical Journal for Experimental and Clinical Research, Poland (USA), BBA-Biomembrane, Journal of Infectious Diseases, Nanotechnology and Langmuir.

**Prof. Suman Kundu**

- Reviewer of research grant proposals for CSIR, DBT and DST, Govt. of India.
- Reviewer of research papers for PLoS One, Indian Journal of Microbiology, FEBS Letters, Indian Journal of Biotechnology, Cell and Developmental Biology, Journal of Agriculture and Food Chemistry.

**Prof. Alo Nag**

- Reviewer of research grant proposals for CSIR, DBT and DST, Govt. of India.
- Reviewer of research papers from Molecular Cancer (USA), eCancer (UK), PLoS One, PLASMID (USA), Current Cancer Drug Targets (USA), Genetics Research International (USA) and Molecular Cancer Biology (USA).

**Dr. Amita Gupta**

- Reviewer of research grant proposals for DBT and DST, Govt. of India.
- Reviewer of research papers for PLoS ONE, Indian Journal of Microbiology, Microbiology, BMC Microbiology.

**Dr. Suneel Kateriya**

- Reviewer of research papers from New Phytologist, PLoS One, Indian Journal of Microbiology, Journal of Applied Phycology, International Journal of Photoenergy.

**Dr. Garima Khare**

- Reviewer of research papers for PLoS ONE and Journal of Antimicrobial Chemotherapy.

**27. Faculty recharging strategies (UGC, ASC, Refresher / orientation programs, workshops, training programs and similar programs).**

| S. No. | Type of Course   | Details   |
|--------|------------------|---|
| 1.     | Refresher course | Refresher course in biochemistry sponsored by the University Grants Commission, 28 <sup>th</sup> June – 17 <sup>th</sup> July 1993.   |
|        |                  | Refresher course in Immunology sponsored by the University Grants Commission, 28 <sup>th</sup> September - 17 <sup>th</sup> October 1992.   |
|        |                  | Refresher course in Biochemistry sponsored by the University Grants Commission, 31 <sup>st</sup> March – 19 <sup>th</sup> April 1991.   |
| 2.     | Workshop         | Workshop entitled, “Machine Learning Techniques in Bioinformatics” held at the Department of Biochemistry, University of Delhi South Campus and JNU, New Delhi, 28 <sup>th</sup> - 29 <sup>th</sup> March 2005. |
|        |                  | Workshop entitled, “Biological databases – Mining of Information” held at the Department of Biochemistry, University of Delhi South Campus and JNU, New Delhi, 28 <sup>th</sup> - 29 <sup>th</sup> March 2003.  |
|        |                  | Workshop entitled, “Applications of Genomics and Proteomics” held at the Department of Biochemistry, University of Delhi South Campus and JNU, New Delhi, 1 <sup>st</sup> - 3 <sup>rd</sup> February 2002.      |
|        |                  | Workshop entitled, “Bioinformatics and its Application to Biology” held at the Department of Biochemistry, University of Delhi South Campus, New Delhi, 22 <sup>nd</sup> - 23 <sup>rd</sup> March 2000.         |

**28. Student projects**

- **Percentage of students who have done in-house projects including inter-departmental projects** : 100%
- **Percentage of students doing projects in collaboration with other universities / industry / institute** : None

**29. Awards / recognitions received at the national and international level by**

**Faculty**

**Prof. Anil K. Tyagi**

- J.C. Bose National Fellow, Department of Science and Technology, GOI (2010).
- Vigyan Gaurav Samman Award by UP Government. (2010).
- Vice President, Society of Biological Chemists (India) from 2004-2006.
- Ranbaxy Research Award by Ranbaxy Science Foundation (1999).
- Dr. Nitya Anand Endowment Lecture Award by INSA (1999).
- Shanti Swarup Bhatnagar Prize by CSIR (1995).
- P.S. Sarma memorial award by the Society of Biological Chemists (India) (1993).

- C.R. Krishnamurthy Memorial Oration Award by CDRI, Lucknow
- Prof. S.H. Zaidi Oration Award by ITRC, Lucknow,
- 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

#### **Prof. Vijay K. Chaudhary**

- 2014, Biotech Product and Process Development and Commercialization Award, Department of Biotechnology, Government of India.
- Bachhawat Memorial Lecture award by National Academy of Sciences India (2009).
- WIPO (World Intellectual Property Organization, Geneva) Gold Medal for “Best Invention of the Year 2004” for inventing “On-site Detection of HIV (AIDS) (2005).
- 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).
- Biotech Product and Process Development and Commercialization Award, Department of Biotechnology, Government of India (2002).
- All India Biotech Association (AIBA) Award (1999).
- VASVIK Award for Biological Science and Technology (1997).
- The National Institutes of Health, USA (NIH) Director’s Award (1991).
- Fellow of the National Academy of Sciences

#### **Prof. Prahlad C. Ghosh**

- Fellow of National Academy of Sciences, India

#### **Prof. D.P. Sarkar**

- Awarded a Gold Medal from the Banaras Hindu University for standing first in the M.Sc. (Biochemistry) examination in 1980.
- 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.
- Awarded an ICRETT Fellowship by the “International Union Against Cancer” to work in NCI/NIH, USA from May 16th to August 1st, 1989.
- Awarded Shanti Swarup Bhatnagar Prize in *Biological Sciences*, 1998.
- Conferred M. Sreenivasaya Memorial Award, by SBC, India, 2005
- Recipient of J.C. BOSE National Fellowship (DST) Award, September, 2010
- Conferred Prof. B.K. Bachhawat Memorial Lecture Award 2011 by NASI, Allahabad
- Elected, Fellow of The National Academy of Sciences, India (1996).
- Elected, Fellow of The Indian Academy of Sciences (2007).
- Elected Fellow of the Indian National Science Academy (INSA), New Delhi, 2010.
- Elected Fellow of the West Bengal Academy of Science & Technology (WAST), December 2011
- Elected Member, Guha Research Conference, India
- Elected Member, Molecular Immunology Forum, India
- Life Member Society of Biological Chemists, India

### **Prof. Suman Kundu**

- Indo-US Research Fellow from Indo-US Science and Technology Forum and DST, Government of India (2010) (International).
- Citation in Marquis Who's Who in Medicine and Healthcare 2011-2012 (8th Edition) (International)
- DST (Government of India) Travel Award for Attending International Conference Abroad, (2008).

### **Prof. Alo Nag**

- Invited as Research Scientist Fellow in University of Illinois at Chicago, USA, from May to July (2012)
- Young Scientist travel grant awarded by Council of Scientific and Industrial Research (CSIR, India) to attend the 17<sup>th</sup> International Congress of Biochemistry and Molecular Biology Conference, 1997, San Francisco, California.
- Young Scientist award in the 4<sup>th</sup> International Symposium on Biochemical Roles of Eukaryotic Cell Surface Macromolecules, 1996, New Delhi, India.

### **Dr. Amita Gupta**

- Senior Innovative Young Biotechnologist Award (Senior-IYBA) by Department of Biotechnology, Ministry of Science and Technology, Govt. of India (2010).
- Indian National Science Academy (INSA) Young Scientist Award in the field of Medical Sciences for the year 2006 (2007).
- Gordon Research Conferences Chair fellowship to attend Gordon Research Conference on Tuberculosis Drug Development at Oxford, UK in August, 2007.
- Innovative Young Biotechnologist Award (IYBA) 2005 by Department of Biotechnology, Ministry of Science and Technology, Govt. of India (2006).
- 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) (2005).
- 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)” (2004).
- Awarded Dr. D. L. Srivastava Young Scientist Award by Society of Biological Chemists (India) at the special scientific session held at Lucknow (2003).
- Awarded Young Scientist Award (New Biology Section) by Indian Science Congress Association at the 90<sup>th</sup> Session held at Bangalore (2003).
- Selected for travel fellowship and free registration by CSIR to attend symposium on ‘The current excitement in Biology’ held at CCMB, Hyderabad (2002).
- Sanctioned funding for an independent project by DST, Govt. of India under the ‘Fast Track scheme’ (2002).
- Awarded Outstanding Young Scientist Prize for the year 2001 by International Business Communications, USA (2001).
- Awarded full travel fare by Council for Scientific and Industrial Research, Govt. of India to attend IBCs fifth Biomolecular Diversity Conference held at Waltham, Massachusetts, USA (2000).

- Awarded gold medal for securing first position in Delhi University in M.Sc. (Biochemistry) (1995).

#### **Dr. Suneel Kateriya**

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

#### **Dr. Garima Khare**

- Indian Young Biotechnologist Award of Department of Biotechnology, Government of India (2013)

#### **Doctoral / post doctoral fellows**

- **Garima Khare.** 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. ***The first author was selected for Best Oral Presentation Award.***
- **Priyanka Chauhan.** Mycobactin biosynthesis is essential for the growth and virulence of *Mycobacterium tuberculosis*: An attractive target for therapeutic interventions. Presented at National Science Day Symposium 2013, held at University of Delhi South Campus. ***The first author was selected for Best Oral Presentation Award.***
- **Garima Khare, Vibha Gupta, Rakesh K. Gupta, Radhika Gupta, Rajiv Bhat and Anil K. Tyagi.** Dissecting the role of critical residues and substrate preference of a Fatty Acyl-CoA Synthetase (FadD13) belonging to a virulence associated operon of *Mycobacterium tuberculosis*. Presented at International Symposium “Understanding and Managing Pathogenic Microbes (UMPM 2010)” organized by Institute of Microbial Technology, Chandigarh. ***The first author was selected for Best Poster Award.***
- **Garima Khare, Prachi Nangpal, Anil K. Tyagi.** 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”, 2014, held at Mahatma Gandhi Institute of Medical Sciences, Sevagram. ***The first author was selected for Best Poster Award.***
- **Ritika Kar, Priyanka Chauhan, Garima Khare, Prachi Nangpal, Anil K. Tyagi.** rBCG85C – A Superior Vaccine than BCG : Modifications for Human Clinical Trials. Presented at National Science Day Symposium (2013), held at University of Delhi South Campus. ***The first author was selected for Best Poster Award.***
- **Vinoth Rajendran, Mohsin Raza, Shilpa Rohra and Prahlad C. Ghosh.** Evaluation of liposomal monensin in combination with artemisinin on growth inhibition of blood stages of *Plasmodium falciparum* (3D7) *in vitro*. Presented at International conference on “Emerging trends of Nanotechnology in drug discovery” (2014), held at University of Delhi south campus. ***The first author was selected for 1<sup>st</sup> Best Poster Award.***

- **Vinoth Rajendran, Manendra Pachauri, Mohsin Raza**, selected for Biotechnology Entrepreneurship student team at “ABLE-BEST INDIA 2014”, held at Fortune select trinity hotel, Bangalore. *The team members were awarded travel fellowship.*
- **Manendra Pachauri** and Prahlad C. Ghosh. Combination of Curcumin and Monensin Loaded Poly(lactic-co-glycolic acid) Nanoparticles for Cancer Therapy. Poster presented at 3rd International Conference of Carcinogenesis Foundation-Frontiers in Carcinogenesis and Preventive Oncology Molecular Mechanisms to Therapeutics, New Delhi, India, 19-21 November, 2012. *The first author was selected for Award of Excellence.*
- **Sanjay Kumar Dey**, B.K. Thelma and Suman Kundu. Dopamine- $\beta$ -hydroxylase as a novel drug target for cardiovascular diseases: *In silico* identification and *in vitro* validation of novel inhibitors. Poster presented at Conference on Recent Advances in Computational Drug Design, Indian Institute of Science, Bangalore, 16-17 September, 2013. *The first author was selected for 3<sup>rd</sup> Best Poster award.*
- **Sanjay Kumar Dey**, Abhishika Srivastava, Rachana Muley, B.K. Thelma and Suman Kundu. *In silico* identification and *in vitro* validation of novel inhibitors to combat cardiovascular diseases exploiting dopamine- $\beta$ -hydroxylase as the drug target. Poster presented at SYSCON-2013 on Interfacing Basic and Translational Research, All India Institute of Medical Sciences, New Delhi, India, 23 August, 2013. *The first author was selected for Best Poster Award.*
- **Sanjay Kumar Dey** and Suman Kundu. Identification of Novel Inhibitors against Human Dopamine- $\beta$ -Hydroxylase, a Drug Target for Cardiovascular Diseases. Oral presentation at National Symposium on Frontiers of Biophysics, Biotechnology and Bioinformatics and 37<sup>th</sup> Annual Meeting of Indian Biophysical Society (IBS), University of Mumbai, Kalina Campus, Mumbai, India, 13-16 January, 2013. *The first author was awarded Ratna Phadke Young Scientist Award.*
- **Amit Kumar** and Suman Kundu. **Boehringer Ingelheim Fonds Travel Fellowship** for visit to Russia (2012) (**International**)
- **Amit Kumar** and Suman Kundu. Regulation of ligand binding in classical plant hemoglobins: Structural aspects of heme pocket. Poster presented at Indo-US Workshop / Symposium on Modern Trends in Macromolecular Structures, Indian Institute of Technology Bombay, Mumbai, India, 21-24 February, 2011. *The first author was selected for Travel Award.*
- **Amit Kumar**, Sheetal Uppal, Komal Choudhary and Suman Kundu. Regulation of Ligand Binding and Stability in Leghemoglobins. Poster presented at First DU-SDU Seminar on Emerging Trends in Interfacial Areas of Chemical, Biological and Environmental Sciences, University of Delhi and University of Southern Denmark, New Delhi, India, 17-18 March, 2008. *The first author was selected for 2<sup>nd</sup> Best Poster award.*
- **Neha Jaiswal**, Rince John, Vaibhav Chand and Alo Nag (2014): "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. *The first author was selected for oral presentation in the Young Researcher's Forum. The first author was also selected for Young Scientist Travel Award by DST, Govt. of India.*
- **Vaibhav Chand**, Rince John, Neha Jaiswal, Vandana Kumari and Alo Nag(2012). "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. *The first author of the poster was selected for oral presentation and received Excellence Award.*



- **Neha Jaiswal**, Rince John, Vaibhav chand and **Alo Nag (2012)**. " 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. *The first author of the poster was selected for a podium presentation and received an Excellence Award.*
- **Neha Jaiswal** and Alo Nag (2012). "FOXMI Biology: In Cellular Physiology and Pathology", UGC-SAP, Department of Biochemistry, University of Delhi South Campus. *The Poster was selected for 3<sup>rd</sup> Best Poster Award.*
- **Vaibhav Chand**, Rince John, Neha Jaiswal and Alo Nag (2011). "Unraveling the Role of hADA3 in HPV mediated Oncogenesis", International Symposium on Cancer Biology, National Institute of Immunology, New Delhi, India, 14-16 November, 2011. *The Poster was selected for an Excellence Award.*
- **Neha Jaiswal** and Alo Nag (2011). " SUMOylation of FOXMI: A Therapeutic Approach against HPV Mediated Oncogenesis", UGC-SAP, Department of Biochemistry, University of Delhi South Campus. *The Poster was selected for 2<sup>nd</sup> Best Poster Award.*
- **Peeyush Ranjan**, Mayanka Awasthi, Sindhu Kandoth Veetil and Suneel kateriya. Cellular trafficking of phototropin and novel modular rhodopsin is mediated by animal like IFT machinery in *Chlamydomonas reinhardtii*, 7th Annual Convention of ABAP & International Conference on Plant Biotechnology, Molecular Medicine & Human Health, New Delhi, **India**. October 18th-20th, 2013. *The first author was selected for Junior Scientist Award.*
- **Peeyush Ranjan**, Mayanka Awasthi, Rudra Shankar, Peter Hegemann and Suneel Kateriya. Distribution of Modular Enzymerhodopsins in Microalgae, 15th International Conference on the Cell and Molecular Biology of *Chlamydomonas*, June 5-10, 2012, Potsdam, **Germany**. *The first author was selected for International Travel Award from organizing committee of the German funding agency and Young Scientist Travel Award from DST, Govt. of India.*
- **Mayanka Awasthi**, Jyoti Batra and Suneel Kateriya, Disulfide Bridge Mediates the Apparent Lipid Specificity and Dimer Stability of Membrane Bound Phospholipase C in *C. reinhardtii*, 15th International Conference on the Cell and Molecular Biology of *Chlamydomonas*, June 5-10, 2012, Potsdam, Germany. **First author was awarded for the International travel grant from DBT, Govt of India.**
- **Peeyush Ranjan\***, Mayanka Awasthi\* and Suneel Kateriya, Microalga: "mimicking the mammalian like IFT mediated trafficking of rhodopsin", National Science Day Symposium, UDSC, 28th February, 2013. India. (\*equally contributed). *The poster was selected for 3<sup>rd</sup> Best Poster Award.*
- Mayanka Awasthi\*, **Peeyush Ranjan\***, Meenakshi Tanwar\* and Suneel Kateriya, Cellular and biochemical characterization of optozymes from lower eukaryotes, National Science Day Symposium, UDSC, 28th February, 2011. India (\*equally contributed). *The poster was selected for Best Poster Award.*

**30. Seminars/ Conferences/Workshops organized and the source of funding (national/international) with details of outstanding participants, if any:**

- National Symposium on "Ramachandran Manifestation: Peptide to Proteome", Commemorating 50 years of Ramachandran Map, 14<sup>th</sup>-15<sup>th</sup> March 2013, UGC-SAP Programme, Department of Biochemistry, Distributed Information Sub-Centre, UDSC and Department of Biochemistry, Sri Venkateswara College (outstanding participants – Prof. D. Balasubramanian, Research Director, L.V. Prasad Eye Institute and Prof. A.G.

Rao, Chair, Department of Biochemistry, Biophysics and Molecular Biology, Iowa State University, USA).

- Symposium on “Systems Biology” held at the Department of Biochemistry, University of Delhi South Campus, New Delhi, March 26, 2012 (Rs.1.5 lakhs, national).
- UGC-SAP Symposium on “Development of Molecular Strategies to Combat Various Human Diseases” held on March 23 2012, Biotech Centre Auditorium, University of Delhi South Campus, New Delhi (Rs.2.0 lakhs, national).
- “Frontiers in Biological Sciences”, March 16, 2012, DST-PURSE and Delhi University sponsored symposium, S.P. Jain Auditorium, University of Delhi South Campus, New Delhi (Rs. 1 lakh, national).
- UGC-SAP Symposium on “Development of Molecular Strategies to Combat Various Human diseases” held on 17-18<sup>th</sup> March 2011, Biotech Centre Auditorium, University of Delhi South Campus, New Delhi (Rs.1.5 lakhs, national).
- Symposium-cum-workshop on “Next Generation Sequencing Data Analysis” jointly organized by the Department of Biochemistry, University of Delhi South Campus and JNU, New Delhi, 28<sup>th</sup> – 29<sup>th</sup> January 2011 (Rs.1 lakhs, national).
- UGC-SAP Symposium on “Development of Molecular Strategies to Combat Various Human diseases” held on 17-18<sup>th</sup> March 2010, Biotech Centre Auditorium, University of Delhi South Campus, New Delhi.
- “Emerging Trends in Globin Research: Need to Imbibe New Approaches and Technologies” February 6, 2010, Biotech Centre Auditorium, University of Delhi South Campus, New Delhi (Rs.1.5 lakh, national).
- National conference on “Drug Discovery and Development” organized by Bioinformatics Centre, Sri Venkateswara College in association with Bioinformatics Centre, DISC, Department of Biochemistry, University of Delhi South Campus, 21<sup>st</sup> – 23<sup>rd</sup> January 2009 (Rs.1 lakh, national).
- Special seminar on “Chemical Diversity in Biology” at S.P. Jain Auditorium, University of Delhi South Campus on September 18, 2013 (outstanding participant - Prof. P. Balaram, Director, IISc. Bangalore)

### **31. Code of ethics for research followed by the departments:**

- The students and faculty members observe very high standards in respect of ethics for publication, use of animals for research, biosafety etc. Any project involving radioactivity is monitored by departmental radiation safety officer. Every departmental member is regularly exposed to procedures to safeguard any type of malpractices.
- All the laboratory supervisors ensure that the research work undertaken under their guidance and supervision is original. They also ensure that the work is carried out by the student(s) themselves. For writing the thesis/reports/scientific manuscripts the supervisors ensure that these are original writings. Plagiarism is avoided at all costs using appropriate softwares and alertness by supervisors.
- It is also ensured that all research projects are routed through appropriate committees like Institutional Bio-safety Committee (IBSC) & Animal ethics committee and Institutional Ethics Committee.
- The supervisors ensure that Good Microbiological Practices (GMP) and Good Laboratory Practices (GLP) are followed during research including the P3 level containment practices as and when appropriate.



**32. Student profile programme-wise:**

| Name of the Programme<br>(refer to question no. 4) | Applications received | Selected       |                 | Pass percentage |        |
|--|-----------------------|----------------|-----------------|-----------------|--------|
|  |                       | Male           | Female          | Male            | Female |
| M.Sc. Biochemistry                                 | 166                   | 01             | 11              | 100%            | 100%   |
| M.Phil. Biotechnology*                             | 160                   | Nil            | 06              | N/A             | N/A    |
| Ph.D. Biochemistry <sup>&amp;</sup>                | N/A                   | 9 <sup>§</sup> | 24 <sup>§</sup> | N/A             | N/A    |

\* In collaboration with other departments of FIAS <sup>§</sup>currently enrolled. <sup>&</sup>Currently, there is no annual or biannual system. As per the existing ordinance VIB, students with fellowship are enrolled directly, and those with fellowship in the project are interviewed before enrollment.

**33. Diversity of students:**

| Name of the Programme | % of students from the same university | % of students from other universities within the State | % of students from universities outside the State | % of students from other countries |
|-----------------------|--|--|---|------------------------------------|
| M.Sc. Biochemistry    | 95%                                    | 0%   | 5%  | 0%                                 |
| M.Phil. Biotechnology | 0%                                     | 0%   | 100%  | 0%                                 |
| Ph.D. Biochemistry    | 21%                                    | 09%  | 70%   | 0%                                 |

**34. How many students have cleared Civil Services and Defence Services examinations, NET, SLET, GATE and other competitive examinations? Give details category-wise.**

NET : 30

**Other competitive examinations:**

CSIR : 13  
ICMR : 03  
DBT : 03  
UGC : 10  
DST : 01

**35. Student progression:**

| Student progression | Percentage against enrolled  |
|---------------------|--|
| UG to PG            | 8% join DU; remaining go to other Universities                           |
| PG to M.Phil.       | Not Applicable   |
| PG to Ph.D.         | 20% join DU; remaining go to other National & International Institutions |

|  |                        |
|--|------------------------|
| Ph.D. to Post-Doctoral   | 20-25%                 |
| Employed<br>• Campus selection<br>• Other than campus recruitment. | Not Applicable<br>100% |
| Entrepreneurs  | 5%                     |

**36. Diversity of staff:**

|  |     |
|--|-----|
| <b>Percentage of faculty who are graduates</b> |     |
| of the same university                         | 40% |
| from other universities within the State       | Nil |
| from universities from other States            | 60% |
| from universities outside the country          | Nil |

**37. Number of faculty who were awarded M.Phil., Ph.D., D.Sc. and D.Litt. during the assessment Period :** None

**38. Present details of departmental infrastructural facilities with regard to**

- a) **Library** : Departmental library receives 10 journals and has a collection about 200 books which are primarily used by M.Sc. students
- b) **Internet facilities for staff and students** : All research laboratories, M.Sc. laboratories and classrooms and office are equipped with Internet Facilities
- c) **Total number of class rooms** : Two
- d) **Class rooms with ICT facility** : The classrooms are equipped with Desktop Computers, Internet Facilities and LCD Projectors
- e) **Students' laboratories** : M.Sc. laboratories are equipped with modern instruments, Desktop Computer, overhead Projectors and Internet Facilities and have work benches to carry out experiments
- f) **Research laboratories** : Research laboratories are equipped with various instruments related to specialization of the laboratories. All laboratories have state-of-art research facilities

**39. List of doctoral, post-doctoral students and Research Associates (current)**

- a) **from the host institution/university** : 09
- b) **from other institutions/universities** : 31

**List of doctoral and post-doctoral students (as on 30<sup>th</sup> November 2014)**

**Prof. Anil K. Tyagi**

**Doctoral**

1. Akshay Rohilla
2. Prachi Nangpal
3. Ritika Kar
4. Shingar Sharma
5. Swati Singh
6. Shubhita Mathur

**Post-doctoral**

1. Dr. Priyanka Chauhan (Research Scientist)

**Prof. Vijay K. Chaudhary**

**Doctoral**

1. Vaishali Verma
2. Shruti Bakshi
3. Shikha Singh
4. Payal Grover
5. Kapil Mathur
6. Charanpreet Kaur (Submitted)

**Post-doctoral**

1. Dr. Nimisha Shrivastava

**Prof. Prahlad C. Ghosh**

**Doctoral**

1. Pooja Tiwari
2. Deepa Jha
3. Vandana
4. Vinoth Rajendran
5. Mohsin Raza
6. Shivani Sharma

**Prof. Debi P. Sarkar**

**Doctoral**

1. Sunandini Chandra
2. Mumtaz Khan (Submitted)
3. Nirmalya Ganguli (Submitted)

### **Prof. Suman Kundu**

#### **Doctoral**

1. Richa Arya
2. Sanjay Kumar Dey
3. Pushpanjali Dasauni
4. Manish Shandilya (Submitted)

### **Prof. Alo Nag**

#### **Doctoral**

1. Neha Jaiswal
2. Pallavi Singhal
3. Rince John (Submitted)
4. Vaibhav Chand (Submitted)

### **Dr. Suneel Kateriya**

#### **Doctoral**

1. Meenakshi Tanwar
2. Yama Atri
3. Komal Gaur
4. Mayanka Awasthi (Submitted)

**40. Number of postgraduate students getting financial assistance from the university : 14**

**41. Was any need assessment exercise undertaken before the development of new programme(s)? If so, highlight the methodology**

In the XII<sup>th</sup> Plan, the Department has proposed to start a new M.Sc. course “Master of Science in “Translational Biochemistry”

**42. Does the department obtain feedback from**

**a. faculty on curriculum as well as teaching-learning-evaluation? If yes, how does the department utilize the feedback?**

The feedback of the faculty on curriculum is sought during the departmental meetings which are held almost every month. This is taken into account while the course revision is undertaken.

**b. students on staff, curriculum and teaching-learning-evaluation and how does the department utilize the feedback?**

The feedback of the students on curriculum is undertaken during discussions with the students especially during the project presentation by the final year students which are more mature and are ready to give good advice based on their experience to

improve the syllabus and teaching methodology. This is taken into consideration during the curriculum revision.

**c. alumni and employers on the programmes offered and how does the department utilize the feedback?**

The alumni who are employed to teach Biochemistry course at undergraduate level in the Delhi University colleges regularly give feedback for improvement/revision of the curriculum.

**43. List the distinguished alumni of the department (maximum 10)**

| Name                  | Designation      | Address   |
|-----------------------|------------------|---|
| Dr. Murali D. Bashyam | Scientist        | CDFD, Hyderabad   |
| Dr. Ashima Kushwaha   | Asstt. Professor | Indian Institute of Scientific Research, Gandhinagar                                |
| Dr. Deepak Kaushal    | Professor        | Tulane National Primate Research Center, USA  |
| Dr. Sanjay Gupta      | Assoc. Professor | Jaypee Institute of Information Technology, NOIDA, UP                               |
| Dr. Sandeep Saxena    | Scientist        | NII, New Delhi  |
| Dr. Seemha Rai        | Asstt. Professor | Panjab University   |
| Dr. Vivek Rao         | Asstt. Professor | Institute of Genomics and Integrative Biology, Mall Road, Delhi                     |
| Dr. Siddhartha Jana   | Assoc. Professor | Dept. of Biological Sciences, Indian Association of Cultivation of Science, Kolkata |
| Dr. Ramandeep Singh   | Asstt. Professor | THSTI, Gurgaon  |
| Dr. Amit Singh        | Asstt. Professor | IISC, Bangalore   |
| Dr. Nisheeth Agrawal  | Asstt. Professor | THSTI, Gurgaon  |

**44. Give details of student enrichment programmes (special lectures / workshops /seminar) involving external experts.**

| Name of External Experts   | Designation& Address  | Subject of Lecture                                  |
|----------------------------|---|---|
| Dr. Sanjay Gupta           | Assoc. Professor, Jaypee Institute of Information Technology, NOIDA, UP | Protein-interaction technologies                    |
| Dr. G. Balakrish Nair      | Executive Director, THSTI, Gurgaon                                      | From Genomes to Public Health : The cholera example |
| Dr. Purnananda Guptasharma | Professor, IISER Mohali   | Protein Engineering                                 |
| Dr. Satyajit Rath          | Senior Scientist, NII, New Delhi  | Cellular immunology                                 |
| Dr. Anna George            | Senior Scientist, NII, New Delhi  | Cellular immunology                                 |
| Dr. Vinita Bal             | Senior Scientist, NII, N.Delhi  | Molecular immunology                                |
| Prof. Gobardhan Das        | Professor, SCMM, JNU  | Cellular Immunology                                 |
| Prof. M. Brunori           | University of Rome, Italy   | Morphogenesis of Proteins                           |

**45. List the teaching methods adopted by the faculty for different programmes.**

Teaching is carried out by a combination of the following:

- PowerPoint lectures by teachers
- Interactive discussion with students during the lectures
- Periodic question-answer sessions during the classrooms teaching
- Writing assignments given to students
- Seminars by the students

**46. How does the department ensure that programme objectives are constantly met and learning outcomes are monitored?**

That the programme objectives are met is ensured by:

- Taking feedback from the students
- Periodic evaluation of the students
- Monitoring the performance of the students during examinations
- Departmental meetings

**47. Highlight the participation of students and faculty in extension activities:**

The faculty members regularly visit colleges of the University for interacting with undergraduate students, deliver lectures and seminars and teach specialized courses. The faculty members also deliver lectures in different institutions across the country. They also participate in workshops and share their research work in symposium and conferences.

The students of the department present posters and oral presentations in various national and international conferences. Senior students enrolled in post-graduate programme of University department visit their respective colleges to interact with their juniors.

**48. Give details of “beyond syllabus scholarly activities” of the department.**

1. Participation of the students in lectures/ seminars delivered by external experts in the department as well as in other departments.
2. Mandatory participation of the students in all Pre-Ph.D. seminars and Ph.D. *viva-voce* examinations in the department.
3. Participation of the students in activities like poster presentations, quiz, collage etc. during the science day function.
4. Participation of the students in seminars/workshops conferences being organized in the department.

**49. State whether the programme/ department is accredited/ graded by other agencies? If yes, give details**

No

**50. Briefly highlight the contributions of the department in generating new knowledge, basic or applied.**

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 way, which ensures that fresh, young minds are trained and oriented to create newer knowledge in turn. The two-year full time programme is considered one of the best in the country as evidenced by the quality of

students who complete this course and their achievements. They qualify national level examinations with ease and get absorbed into Ph.D. programmes in the best institutions worldwide.

The department has a rich tradition of an equally vibrant research programme in both basic and innovative applied research. While basic research has resulted in large number of publications in high impact journals, applied research has resulted in patents (both national and international) and also successful transfer of developed technologies to Indian industry, which converted the leads from the department into commercialized products. Notable examples of technologies transferred and commercialized are:

- (1) Liposomal Amphotericin B - commercialized by Life Care Innovations, Gurgaon.
- (2) Monoclonal antibodies to M13 phage protein - commercialized by M/s GE HealthCare (multinational).
- (3) Rapid test for HIV (AIDS) - commercialized by M/s Cadilla Pharmaceuticals Limited, Ahmedabad
- (4) Detection of *M. tuberculosis* in culture - transferred to M/s SPAN Diagnostics Limited, Surat and is likely to be available in the market shortly as the product has received approval from Drug Controller General of India.
- (5) Virosome Technology for targeted delivery – transferred to Pancea Biotech. India, New Delhi.

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 and jaundice/hepatitis, some of which are in clinical trials as well. 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.

The department is equally at ease in basic research for newer knowledge creation with potential for translation. Several research initiatives in mechanistic understanding of pathogenesis, host virus membrane fusion, liposomal and nanomaterial formulation, oncogenesis, photosignalling, amyloidosis, stability and structure-function relationship of proteins and others are ongoing. 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.

**51. Detail five major Strengths, Weaknesses, Opportunities and Challenges (SWOC) of the department.**

**Strength:**

- Highly active research in the areas of frontiers of modern biology with special emphasis on human diseases. The emphasis is also laid on the translational aspect of the research work through interaction and participation of industry.
- The M.Sc. programme in addition to theoretical knowledge provides considerable emphasis on the hand on experience in the fore-front areas of biochemistry through a dissertation based on research work and thesis writing.
- Special emphasis on critical review of literature and presentation by way of training in seminars.
- Very well equipped international standard laboratories
- Financial support from FIST and UGC-SAP programme. Also, high level funding for research from funding agencies such as DBT, DST, UGC, ICMR and CSIR.

**Weaknesses:**

- Space constraints to further expansion.
- Shortage of grant for post-graduate teaching and departmental infrastructures.

**Opportunities:**

- Emerging areas of translational biotechnology such as diagnostics strategies and development of kits for commercialization. Development of TB vaccines to channel into clinical trials, Gene delivery strategies for humans through virosomes and liposomes, development of new analogs of hemoglobins, Industrial interaction
- Attracting industry for R&D collaborations.

**Challenges:**

- Streamlining of commercialization of processes and products.

**52. Future plans of the department.**

- Future plans of the department include elevation of its teaching and research performance to an even higher stratum that suits the dynamics of the changing times and caters to the emerging needs of the country.
- The department envisions the need to convert the classical knowledge of biochemistry into more meaningful deliverables required to alleviate human suffering in general. With the tremendous progress both academically as well as technically, the need to translate conventional knowledge into innovations for management as well as amelioration of human diseases will be emphasized. Hence, the department will expand its ongoing programme in the areas of diagnostics, prophylactics and therapeutics for diverse human diseases.
- While the existing tuberculosis, malaria and hepatitis research will continue, the department will venture into several other areas like cardiovascular diseases, cervical and breast cancer, ciliopathies, channelopathies, optogenetics, hemoglobinopathies and neurodegenerative diseases with research programme on innovations in mechanistic understanding, target identification and validation, small molecule and peptide screening and newer tools for diagnostics and prophylactics.
- The department will be committed to creation of manpower for both basic mechanistic investigations as well as applied translational aspects of human diseases. It will expand its scope through initiation of research projects in relevant areas, like hard-core immunology and systems biology, via newly appointed faculties to complement the existing strengths.
- The teaching curriculum will witness constant innovations and further hands-on knowledge.



### **Declaration by the Head of the Institution**

I certify that that the data included in this Self-Study Report (SSR) are true to the best of my knowledge.

This SSR is prepared by the institution after internal discussions, and no part thereof has been outsourced.

I am aware that the Peer team will validate the information provided in this SSR during the peer team visit.

Signature of the Head of the Department

Place: New Delhi

Date: