

Professor Sadhna Sharma
Miranda House

Name : Dr. Sadhna Sharma
Designation : Professor
Department : Zoology
Email : sadhna.sharma@mirandahouse.ac.in



College website Profile: https://www.mirandahouse.ac.in/academe/file_uploads/for-websites/139/cv-website-139.pdf

EDUCATION

- Ph.D.(Immunology), VP Chest Institute, University of Delhi, 1996.
- M.Sc. (Specialization: Endocrinology), Dept. of Zoology, University of Delhi, 1985.
- B.Sc.(Honours) Zoology, Daulat Ram College, University of Delhi, 1983.

CAREER PROFILE

- Professor at Dept. of Zoology, Miranda House, University of Delhi, - 2020 to date.
- Associate Professor at Dept. of Zoology, Miranda House, University of Delhi, - 2017 to 2020.
- Assistant Professor at Dept. of Zoology, Miranda House, University of Delhi, - 2006 to 2017.
- Lecturer (Guest/Ad-Hoc) at Daulat Ram College, University of Delhi, 2005-2006.
- Visiting Fellow at School Of Biochemistry And Molecular Biology And John Curtin School Of Medical Research, Australian National University, Canberra, Australia, April-Sep, 2004.
- DST Young Scientist at Dept. of Microbiology, V. P. Chest Institute, University of Delhi, 2002-2004.
- Guest Lecturer At B. R. Ambedkar Centre For Biomedical Research, University of Delhi, 2000-2004.
- Research Associate at Dept. of Microbiology, V. P. Chest Institute University of Delhi, 1998-2002.
- Lecturer (Ad-Hoc) at ANDC, University of Delhi, 1996-1997.

Teaching and Research Excellence

Research Guidance:

She has been recognized by the Faculty of Science, University of Delhi as independent supervisor for guiding students for Ph.D. **Four of her students have been awarded Ph. D degree and 4 are currently registered and pursuing their Ph.D under her supervision.** Two more PhD students of VPCI got their degree from DU Medical Faculty where she was the Co-Supervisor. She herself and 4 members of her team (Two PhD students, her collaborating faculty Dr. Monika Sharma and a undergraduate Summer Trainee) have got prestigious Melinda and Bill Gates Travel Award to present their work on tuberculosis in USA, London, Canada and India respectively in different years. One of her Ph D student Dr. Swati Singh is appointed as Permanent Faculty in Department of Zoology, University of Delhi.

She was coordinator of the Open source Drug Discovery (OSDD) Centre established by Council of Scientific and Industrial Research (CSIR) at Miranda House from 2010-2016 where about 100 undergraduate students performed cloning and expression of specific M.tb genes and bioinformatic approaches to drug discovery. Seven of her undergraduate students were also awarded TATA-CSIR- OSDD fellowships.

This laboratory is also providing a flavour of research to many undergraduates, postgraduates and Ph.Ds.

Sponsored Research Projects (Annexure I):

Sadhna has got Research Grants of about 5.73 Crores in Miranda House with major projects granted from Department of Science and Technology (2006-2009); Council of Scientific and Industrial Research (2010-2016); Department of Biotechnology (2013-2017) and DU Star Innovation Project (2016-2019); ICMR (2023-2024) and DST-SERB (2022-2025) carried out as Principal Investigator (PI); and Department of Science and Technology (2018-2021) and ICMR (2024-2028) as Co-Principal Investigator. - (Annexure I)

Besides this, she was the overall coordinator of DBT Star College project with a grant amount of Rs. 79 lakhs (2016-20) for enhancing the research and teaching of undergraduate science laboratories with coordinators from four science departments of the college.

Research Publications (Annexure II):

Publications: **39 publications in Refereed Journals of which 28 publications are published in Miranda House in last 10 years and 2 preprints.**

Besides this, 25 publications are in International and 12 in National Conference proceedings.

Invited Talks: 04 (International); 08 (National)

Cumulative Impact Factor : >65; Average Impact factor >2.7,

As per Google scholar on 19 April, 2024 - h-index = 15, i10 index = 18, Citations ~ 944

(<https://scholar.google.co.in/citations?hl=en&user=08G3328AAAAJ>)

Collaboration/ Conference

Scientists from VP Chest Institute, University of Delhi; Department of Environmental Studies, DU and School of Biotechnology, GGSIP University are collaborating with her. She is closely collaborating with Indian Immunology Society(IIS) in organizing Continuing Medical Education (CME) programmes, celebrating International Immunology Day, organizing Immunocons, the annual conference of IIS. She has been invited as speaker and chairing sessions in various International and National Conferences.

Innovative Teaching and Research Pedagogy

Sadhna has been involved in teaching papers to the undergraduate students including Immunology, Cell Biology, Biochemistry, Biotechnology, Biostatistics and Bioinformatics using modern pedagogical tools such as power point presentations, online library resources, videos, and educational websites for her work. The classroom has interactive sessions in the form of quizzes, e-posters, group discussions, seminars and book reviews.

She has also introduced the 'Concept Labs' and 'Problem based Learning' (PBL) in the practical classes of Immunology and Biochemistry.

She is also engaged in framing and revising syllabus as and when required including recent LOCF syllabus of DSE Immunology Paper of B.Sc. (H) Zoology and and NEP syllabus of Immunology Core Paper of B.Sc. Life Sciences is involved in organizing workshop and e-manuals for newly introduced courses and experiments in collaboration with Department of Zoology and Institute of Life Long Learning (ILL), University of Delhi.

She has created Online Moodle Courses for 'Undergraduate immunology' and add on course- 'Animal Cell culture and its application' which was quite useful for students in 'Covid' times.

Research students are encouraged to undergo training programmes and acquire critical thinking for designing experiments by discussion, lab meetings and journal clubs.

Sadhna has established an 'Immunology and Biotechnology' laboratory, now named DSKC Bio Discovery laboratory with state of the art equipment as part of Life Science Division of D S Kothari Centre for Research and Innovation in Science Education (DSKC), A Department of Science and Technology funded centre at Miranda House since 2008. All high end equipment required for her research are located in the laboratory where research activities are focused towards finding new Vaccine and Drug targets for tuberculosis/ cancer/ diabetes and include:

- Cloning, expression, purification and validation of new subunit vaccine candidates and drug targets for tuberculosis
- Study of immunomodulatory and cytotoxic activity of medicinal plants.

Undergraduate students are provided an experiential learning in this lab specially during summer vacation.

Administrative Contribution

Other than teaching and research, Sadhna has contributed significantly in the following activities:

-Member, Departmental Research Committee (DRC), Department of Zoology, University of Delhi (2014-2016)

-Member, DU LOCF Team (2019), Department of Zoology, University of Delhi.

- Deputy Coordinator, Central Evaluation Centre, MH, 2019

- Deputy Coordinator, Examination Centre, MH, 2022

Chairperson – Institutional Bio-Safety Committee (IBSC), constituted by DBT at MH

Coordinator – Science Setu Programme with NII (2022-2024)

-Member, Research Monitoring Committee of College since 2008

- Coordinator, Department of Life Sciences (2009-11)

- Teacher-in Charge, Department of Zoology (2011-13)

-College Academic Committee and Admission committees (2009-2013)
-Member, College Staff Council Committees – Research Initiative and International Collaboration since 2010; Placement Cell (2014-17) and Workload Committee (2022-24).
- Coordinator, Zoology component of DBT Star College Project since 2011
- Member, Internal Quality Assurance Cell (IQAC) of College, 2015-2018
- Provided faculty support in compilation of NAAC Self Study Report and NAAC review team visit
- Overall Coordinator, DBT Star College Project November, 2016 –March 2020.
Besides this,

Outreach Activities

Sadhna has contributed significantly to the growth of the institution by organizing various Research and Education Outreach activities, the thrust area of Miranda House that resulted in good NAAC and NIRF rankings to the college. She is the founder coordinator of Add on Course in “Medical Biotechnology” which is successfully running in the college for last 12 years where every year 25-30 students gets hands on training on latest tools and techniques of biomedical sciences.

She has actively mentored nearly 200 students of UG, PG, Ph.D in six week long Summer Camp *Flavours of Research* / Training Programmes run by the college every year as part of DSKC since its inception in 2008.

She is also actively involved in the Inspire Internship program where about 250 school students are mentored by the undergraduate students trained during Miranda summer school in specially organized workshops in the DSKC laboratories and co-coordinated two Inspire Science Conclaves.

She has also organized Faculty Development Programmes in Genome Editing tools, Bioinformatics and Grant Writing, and domain specific workshops for students as well as open ended investigative projects in interdisciplinary themes for students. She has successfully conducted a National level ‘Continuing Medical Education’(CME) programme for college teachers at DSKC, MH under the aegis of Indian Immunology Society. As part of DBT Star College Scheme since 2011 with a total grant of about Rs. 155 lakhs, she has also contributed immensely in acquiring the ‘Star Status’ to four Science departments of the College.

Any other significant achievement

- She is member of the Pedagogical Research team of the college and was awarded Australian Leadership Award Fellowship (ALAF) by AusAID in April 2013 to visit University of Sydney for a period of 3 weeks to enhance learning in labs.
- She was also a recipient of Department of Science and Technology ‘Young Scientist’ and ‘Women Scientist’ projects and Australia –India Council (AIC) fellowship, and has got ‘Young Investigator Award’ twice by Federation of Immunological Societies of Asia-Oceania (FIMSA) before joining Miranda House.
- Sadhna’ work is recognized by The Immune Epitope Database and Analysis Resource (IEDB) that is sponsored by the National Institute of Allergy and Infectious Disease (NIAID).
IEDB Reference ID 1035611 (<http://www.iedb.org/refId/1035611>)

Annexure I

Sponsored Research Projects at Miranda House:

Ongoing EMR Project:

1. ICMR. 2023-2024. Rapid diagnosis of pulmonary tuberculosis based on detection of mycobacterial antigens within serum/urine samples by immuno-PCR assays.

Grant Amount **Rs.35.87514 Lakhs. (PI)**

2. DST-SERB. 2022-2025. Immunological validation and protective efficacy of multiepitope vaccine constructs designed from Mycobacterium tuberculosis dormancy associated proteins Rv2627c and Rv2628 in mouse model of tuberculosis.

Grant Amount **Rs.27.87873 Lakhs. (PI)**

3. ICMR - EMR Intermediate Grant, 2024-2028. Evaluation of immunogenicity and protective efficacy of an epitope-based vaccine designed from late-stage-specific, antigenic PE/PPE proteins of Mycobacterium tuberculosis in human PBMC and mouse model.

Grant amount **Rs. 2.39 Crores (Co-PI)**

Completed Projects at Miranda House:

1. Study of macrophage apoptosis and mitochondrial integrity in response to PE/PE-PGRS family proteins of Mycobacterium tuberculosis. DST, Grant Amount Rs.68.378 Lakhs; (2018-2021) (Co-PI)

2. Therapeutic Potential of Medicinal Plants: Culture, Extraction, Physicochemical Characterization and Testing Their Cytotoxic or Immune-Stimulatory Properties. PI, DU Star Innovation Project, Grant Amount Rs 26.67 Lakhs, 2016-2019 (PI)

3. Molecular Cloning And Immunological Validation Of Three Hypothetical Proteins of *M. Tuberculosis* With Strong T-Cell Epitopes, DBT, Grant Amount Rs. 66.48 Lakhs, 2013-2017 (PI)

4. Expression, Purification And Characterization Of MymA Operon Protein Products of *Mycobacterium Tuberculosis* OSDD-CSIR; Grant Amount Rs. 21.79 Lakhs, 2012-2016

5. Predicting Potential Inhibitors for Mtb Targets. TATA-OSDD-CSIR 2015; Grant Amount Rs. 2.4 Lakhs, 2014-15 (PI)

6. Cloning And Expression Of Selected Intraphagosomal Expressed Genes Of Mycobacterium Tuberculosis, CSIR, 2010-2012; Grant Amount Rs. 5.85 Lakhs (PI)
7. Modulation of Toll Like Receptor (TLR) Signaling By Mycobacterium Tuberculosis: An Evasive Survival Strategy, DST Women Scientist Project, Grant Amount Rs 11.05 Lakhs (2006 – 2009) (PI).

Annexure II

Last 10 years Publications (2014-2024):

1. Priyanka, Sharma, S., Varma-Basil, M., Sharma M. (2024). C-terminal region of Rv1039c (PPE15) protein of *Mycobacterium tuberculosis* targets host mitochondria to induce macrophage apoptosis. Apoptosis (<https://doi.org/10.1007/s10495-024-01965-2>) (Impact Factor 7.2)
2. Priyanka, Sharma, S., Joshi, H., Kumar, C., Waseem, R., Sharma, M. (2024). Mycobacterium tuberculosis protein PPE15 (Rv1039c) possesses eukaryote-like SH3 domain that interferes with NADPH Oxidase assembly and Reactive Oxygen Species production. BBA-Molecular Cell Research, 1871 (4), art. no. 119702. (Impact Factor 5.1)
3. Shah, S., Priyanka, Sharma, S. (2024). An Updated Trial Sequential Meta-analysis of Vitamin D Receptor Gene Polymorphism (Fok1, Bsm1, Taq1 and Apa1) and Risk to Tuberculosis Indian Journal of Clinical Biochemistry, 39 (1), pp. 60-72. Cited 1 time. (Impact Factor 2.1)
4. Kumar, C., Shrivastava, K., Singh, A., Chauhan, V., Giri, A., Gupta, S., Sharma, N.K., Bose, M., Sharma, S., Varma-Basil, M. (2023) Expression of mammalian cell entry genes in clinical isolates of M. tuberculosis and the cell entry potential and immunological reactivity of the Rv0590A protein. Medical Microbiology and Immunology, 212 (6), pp. 407-419. (Impact Factor 5.4)
5. Medha, Priyanka, Sharma, S., Sharma, M. (2023) PE_PGRS45 (Rv2615c) protein of Mycobacterium tuberculosis perturbs mitochondria of macrophages. Immunology and Cell Biology, 101 (9), pp. 829-846. Cited 2 times. (Impact Factor 4.4)
6. Priyanka, Medha, Bhatt, P., Joshi, H., Sharma, S., Sharma, M. (2023) Late stage specific Rv0109 (PE_PGRS1) protein of Mycobacterium tuberculosis induces mitochondria

mediated macrophage apoptosis. *Microbial Pathogenesis*, 176, art. no. 106021. Cited 2 times. (Impact Factor 3.8)

7. Medha, Priyanka, Bhatt, P., Sharma, S., Sharma, M. (2023) Role of C-terminal domain of *Mycobacterium tuberculosis* PE6 (Rv0335c) protein in host mitochondrial stress and macrophage apoptosis. *Apoptosis*, 28 (1-2), pp. 136-165. Cited 7 times. (Impact Factor 7.2)
8. Medha, M., Joshi, H., Sharma, S., Sharma, M. (2023) Elucidating the function of hypothetical PE_PGSR45 protein of *Mycobacterium tuberculosis* as an oxido-reductase: a potential target for drug repurposing for the treatment of tuberculosis. *Journal of Biomolecular Structure and Dynamics*, 41 (19), pp. 10009-10025. Cited 1 time. (Impact Factor 5.235)
9. P. Bhatt, M. Sharma, P.P. Sharma, B. Rathi, S. Sharma. (2022) *Mycobacterium tuberculosis* dormancy regulon proteins Rv2627c and Rv2628 as Toll like receptor agonist and as potential adjuvant. *International Immunopharmacology*, 112 109238. (Impact Factor 5.6)
10. Medha., Priyanka., Sharma, S. & Sharma, M. 2022. Design of a peptide-based vaccine from late stage specific immunogenic cross-reactive antigens of PE/PPE proteins of *Mycobacterium tuberculosis*. *European Journal of Pharmaceutical Sciences* 168: 106051 (Impact Factor 4.384)
11. Medha., Bhatt, P., Priyanka., Sharma, M. & Sharma, S. 2021. Prediction and identification of T cell epitopes of COVID-19 with balanced cytokine response for the development of peptide based vaccines. *In Silico Pharmacology* 9 (1):40 (Impact Factor 3.112)
12. Medha., Sharma, S. & Sharma, M. 2021. Proline Glutamate/ Proline-Proline-Glutamate (PE/PPE) proteins of *Mycobacterium tuberculosis*: The multifaceted immune-modulators. *Acta Tropica* 222: 106035. (Impact Factor 2.7)
13. Priyanka., Sharma, M. & Sharma, S. 2021. Ethnicity Based Comprehensive Evaluation of Polymorphism in Interferon Gamma gene and its association with Pulmonary and Extra-Pulmonary Tuberculosis Risk An updated Trial Sequential Meta-Ananlysis. *International Journal of Mycobacteriology* 10(3): 243-254.

14. Medha Singh, Parul Bhatt, Monika Sharma, Mandira Varma-Basil, Anil Chaudhry, Sadhna Sharma. 2019. Immunogenicity of late stage specific peptide antigens of *Mycobacterium tuberculosis*. *Infect Genet Evol.* 2019 Jun 19; 74:103930. doi: 10.1016/j.meegid.2019.103930. (Impact Factor: 4.4) (Cited by 4)
15. Swati Singh, Monika Sharma, Anil Chaudhry, Sadhna Sharma. 2019. Rv2626c and Rv2032 activate TH1 response and downregulate regulatory T cells in peripheral blood mononuclear cells of tuberculosis patients. *Comparative Immunology, Microbiology and Infectious Diseases* 62: 46-53. Elsevier (Impact Factor: 2) (Cited by 6)
16. Kirti Pandey, Swati Singh, Parul Bhatt, Medha, Monika Sharma, Anil Chaudhry, Sadhna Sharma. 2019. DosR proteins of *Mycobacterium tuberculosis* upregulate effector T cells and down regulate T regulatory cells in TB patients and their healthy contacts. *Microbial Pathogenesis* 126: 399-406. Elsevier (Impact Factor: 3.8) (Cited by 3)
17. R Mishra, S Sharma, RS Sharma, S Singh, MM Sardesai, S Sharma, V Mishra. 2018. *Viscum articulatum* Burm. f. aqueous extract exerts antiproliferative effect and induces cell cycle arrest and apoptosis in leukemia cells. *Journal of Ethnopharmacology* 219, 91-102. Elsevier (Impact Factor: 3.115) (Cited by 2)
18. Saraav, I., Pandey, K., Singh, S., Sharma, M & Sharma, S. 2017. *Mycobacterium tuberculosis* MymA is a TLR2 agonist that activates macrophages and a TH1 response. *Tuberculosis* 106: 16-24. Elsevier (Impact Factor: 3.2) (Cited by 5)
19. Saraav, I., Pandey, K., Misra, R., Singh, S., Sharma, M & Sharma, S. 2017. Characterization of MymA protein as a flavin-containing monooxygenase and as a target of isoniazid. *Chemical Biology & Drug Design.* 89(1):152–160. Wiley Online Library (Impact factor:2.328) (Cited by 3)
20. Mishra R, Das MK, Singh S, Sharma RS, Sharma S, Mishra V. 2017. Articulatin-D induces apoptosis via activation of caspase-8 in acute T-cell leukemia cell line. *Mol Cell Biochem*, 426(1), 87-99. Springer Link (Impact factor:2.561) (Cited by 8)
21. Saraav, I., Pandey, K., Sharma, M., Singh, S., Dutta, P., Bhardwaj, A. & Sharma, S. 2016. Predicting promiscuous antigenic T cell epitopes of *Mycobacterium tuberculosis* mymA operon proteins binding to MHC Class I and Class II molecules. *Infection, Genetics and Evolution.* 44: 182–189. Elsevier (Impact Factor: 2.611) (Cited by 6)

22. Pandey, K., Sharma, M., Saraav, I., Singh, S., Dutta, P., Bhardwaj, A. & Sharma, S. 2016. Analysis of the DosR regulon genes to select cytotoxic T lymphocyte epitope specific vaccine candidates using a reverse vaccinology approach. *International Journal of Mycobacteriology*. 5(1): 34-43. (Cited by 6)
23. Sharma, M. & Sharma, S. 2015. Toll like Receptor-2 signaling in *Mycobacterium tuberculosis* infection- A double edged sword. *Forum on Immunopathological Diseases and Therapeutics*. 6(3-4): 227-235.
24. Saraav Iti, Singh Swati, Pandey Kirti, Vishnoi Ekta, Sharma Monika & Sharma Sadhna. 2015. Cell Wall-Associated *Mycobacterium Tuberculosis* rRv3083 Protein Stimulates Macrophages Through Toll-Like Receptor-2 (TLR2). *International J. Mycobacteriol*. 4: 176. (Cited by 3)
25. Sharma Monika, Sharma Sadhna & Bose Mridula. 2015. *Mycobacterium Tuberculosis* Infected Macrophages Lead To Apoptosis Of Antigen Activated CD8 T Cells. *International J. Mycobacteriol*. 4: 174-5. (Cited by 1)
26. Roy, S., Sharma, S., Sharma, M. & Bose, M. 2014. Differential signaling of inducible nitric oxide synthase induction in *Mycobacterium tuberculosis* infected alveolar epithelial cell line A549 in response to cytokines IFN- γ , TNF- α and IL-1 β . *International Journal of Mycobacteriology*. 3: 17-24. (Cited by 9)
27. Saraav, I., Singh, S., Sharma S. 2014. Outcome of *Mycobacterium Tuberculosis* and Toll-Like Receptor Interaction: Immune Response or Immune Evasion? *Immunol. Cell Biol*. 92: 741-746. Nature Publishing Group (Impact factor:3.795) (Cited by 42)
28. Singh, S., Saraav, I., Sharma, S. 2014. Immunogenic Potential of Latency Associated Antigens against *Mycobacterium Tuberculosis*. *Vaccine* 32: 712-716. Elsevier (Impact Factor: 3.285) (Cited by 45)



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