

## Dr. Deepak Sharma

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### AREA OF SPECIALIZATION

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**Computational Biology, Translational Bioinformatics and Molecular Biology**

### CAREER PROFILE

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Dec'14 - Till date	<b><i>Assistant Professor</i></b> Department of Biotechnology, Indian Institute of Technology Roorkee (IIT-R), Roorkee, India
July'11 - Dec'14	<b><i>Research Scientist C</i></b> Translational Health Science and Technology Institute (THSTI), Gurgaon, India
May'12 - July'12	<b><i>Visiting Faculty</i></b> Institute for Advance Computer Studies, Center for Bioinformatics and Computational Biology, University of Maryland, College Park, USA
July'08 - June'11	<b><i>INSA Young Scientist</i></b> National Institute of Immunology (NII), New Delhi, India
July'06 - June'08	<b><i>DBT-Postdoctoral Fellow (Bioinformatics)</i></b> National Institute of Immunology (NII), New Delhi, India

### ACADEMIC CREDENTIALS

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2006	<b><i>Ph.D. (Biotechnology)</i></b> All India Institute of Medical Sciences (AIIMS), New Delhi, India
2000	<b><i>Master of Biotechnology</i></b> All India Institute of Medical Sciences (AIIMS), New Delhi, India
1998	<b><i>B.Sc.(Hons.) Human Biology (Specialization in Biochemistry)</i></b> All India Institute of Medical Sciences (AIIMS), New Delhi, India

### EDITOR/REVIEWER

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- **Editorial Board Member**, Proceedings of the Indian National Science Academy.
- **Guest Editor** for BioMed Research International.
- **Reviewer** for Nucleic Acids Research, Scientific Reports, BMC Bioinformatics, BMC Medical Genetics, Interdisciplinary Sciences (Springer) and VirusDisease (Springer).
- **Reviewer** for awarding inventions, National Research Development Corporation.
- **Reviewer** for research proposals, DBT-West Bengal

## PUBLICATIONS

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### As independent researcher (\*corresponding author)

1. Malik S, Sadhu S, Pandey RP, Chawla AS, **Sharma D**, Panda L, Rathore D, Ghosh B, Ahuja V, Awasthi A (2017) Transcription factor Foxo1 is essential for IL-9 induction in T helper cells, *Nat Commun*, accepted.
2. Sharma Bhai P, **Sharma D**, Saxena R, Verma IC (2017) Next-Generation Sequencing Reveals a Nonsense Mutation (p.Arg364Ter) in *MRE11A* Gene in an Indian Patient with Familial Breast Cancer, *Breast Care*, 12, 114-116.
3. Vyas B, Puri RD, Namboodiri N, Nair M, **Sharma D**, Movva S, Saxena R, Bohora S, Aggarwal N, Vora A, Kumar J, Singh T, Verma IC (2016) KCNQ1 mutations associated with Jervell and Lange-Nielsen syndrome and autosomal recessive Romano-Ward syndrome in India-expanding the spectrum of long QT syndrome type 1. *Am J Med Genet A*, 170, 1510-1519.
4. **Sharma D\***, Priyadarshini P and Vratil S (2015) Unraveling the web of viroinformatics: computational tools and databases in virus research. *J Virol*, 89, 1489-1501.
5. Bijarnia-Mahay S, Movva S, Gupta N, **Sharma D**, Puri RD, Kotecha U, Saxena R, Kabra M, Mohan N and Verma IC (2015) Molecular diagnosis of Hereditary Fructose Intolerance - founder mutation in a community from India. *JIMD Reports*, 19, 85-93.
6. Movva S, Kotecha U, **Sharma D**, Puri RD and Verma IC (2014) Prenatal diagnosis and elucidation of a novel molecular basis in Carpenter syndrome. *J Fetal Medicine*, 1, 89-93.
7. Kotecha UH, Movva S, **Sharma D**, Verma J, Puri RD and Verma IC (2014) Molecular evaluation of a novel missense mutation and an insertional truncating mutation in SUMF1 gene. *Indian J Med Res*, 140, 55-59.
8. **Sharma D\*** and Surolia A (2013) Pathway targeting, antimycobacterial drug design. *Encyclopedia of Systems Biology* (Springer), 1656-1659.
9. **Sharma D** and Surolia A (2013) Degree centrality. *Encyclopedia of Systems Biology* (Springer), 558.
10. **Sharma D\*** and Surolia A (2011) Computational tools to study and understand the intricate biology of mycobacteria. *Tuberculosis (Edinb)*, 91, 273-276.
11. Chauhan S, **Sharma D**, Singh A, Surolia A and Tyagi JS (2011) Comprehensive insights into *Mycobacterium tuberculosis* DevR (DosR) regulon activation switch. *Nucleic Acids Res*, 39, 7400-7414.
12. **Sharma D\***, Mohanty D and Surolia A (2009) RegAnalyst: a web interface for the analysis of regulatory motifs, networks and pathways. *Nucleic Acids Res*, 37, W193-W201.

### As doctoral/postdoctoral researcher

13. De Majumdar S<sup>#</sup>, **Sharma D**<sup>#</sup>, Vashist A, Kaur K, Taneja NK, Chauhan S, Challu VK, Ramanathan VD, Balasangameshwara VH, Kumar P and Tyagi JS (2010) Co-expression of DevR and DevRN-Aph proteins is associated with hypoxic adaptation defect and virulence attenuation of *Mycobacterium tuberculosis*. *PLoS One*, 5, e9448 (**#equal contribution**).
14. D'Souza-Ticlo D, **Sharma D** and Raghukumar C (2009) A thermostable metal-tolerant laccase with bioremediation potential from a marine-derived fungus. *Mar Biotechnol*, 11, 725-737.
15. **Sharma D** and Tyagi JS (2007) The value of comparative genomics in understanding mycobacterial virulence: *M. tuberculosis* H37Ra genome sequencing - a worthwhile endeavour. *J Biosci*, 32, 185-189.

16. **Sharma D**, Bose A, Shakila H, Das TK, Tyagi JS and Ramanathan VD (2006) Expression of mycobacterial cell division protein, FtsZ, and dormancy proteins, DevR and Acr, within lung granulomas throughout guinea pig infection. *FEMS Immunol Med Microbiol*, 48, 329-336.
17. Bagchi G, Chauhan S, **Sharma D** and Tyagi JS (2005) Transcription and autoregulation of the *Rv3134c-devR-devS* operon of *Mycobacterium tuberculosis*. *Microbiology*, 151, 4045-4053.
18. **Sharma D**, Issac B, Raghava GPS and Ramaswamy R (2004) Spectral Repeat Finder (SRF): identification of repetitive sequences using Fourier transformation. *Bioinformatics*, 20, 1405-1412.
19. Malhotra V, **Sharma D**, Ramanathan VD, Shakila H, Saini DK, Chakravorty S, Das TK, Li Q, Silver RF, Narayanan PR and Tyagi JS (2004) Disruption of response regulator gene, *devR*, leads to attenuation in virulence of *Mycobacterium tuberculosis*. *FEMS Microbiol Lett*, 231, 237-245.
20. Tyagi JS and **Sharma D** (2004) Signal transduction systems of mycobacteria with special reference to *M. tuberculosis*. *Curr Sci*, 86, 93-102.
21. Tyagi JS and **Sharma D** (2002) Genomic study of *Mycobacterium tuberculosis* and its clinical applications. *Indian J Pediatr*, 69, S29-S38.
22. Tyagi JS and **Sharma D** (2002) *Mycobacterium smegmatis* and tuberculosis. *Trends Microbiol*, 10, 68-69.

## **PUBLICATIONS/ABSTRACTS IN CONFERENCES**

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1. **Sharma D**, Mohanty D and Surolia A (2010) RegAnalyst: analyses of regulatory motifs, networks and pathways. *French-Indian Inter-Academic Symposium on Infectious Diseases*, 37-38.
2. **Sharma D**, Issac B, Raghava GPS and Ramaswamy R (2006) Spectral Repeat Finder (SRF): identification of repetitive sequences using Fourier transformation. *Bioinformatics and Computational Biology*, 70-86.
3. **Sharma D**, Ramaswamy R and Tyagi JS (2005) *In silico* analysis of mycobacterial genomes using MyPatternFinder and other bioinformatics tools. *International Training and Research in Emerging Infectious Diseases*, 61 (**Was selected among top 50 entries from Asian region**).
4. **Sharma D**, Bose A, Das TK, Shakila H, Ramanathan VD and Tyagi JS (2004) Controlled overexpression of mycobacterial FtsZ protein in *E. coli* and demonstration of its presence in lungs of infected guinea pigs. *International Symposium on Emerging Trends in Tuberculosis Research*, 139.
5. Tyagi JS, Malhotra V, Saini DK and **Sharma D** (2004) Two-component signal transduction systems of *Mycobacterium tuberculosis* and their role in pathogenesis. *International Symposium on Emerging Trends in Tuberculosis Research*, 21.

## **COMPUTATIONAL BIOLOGY EXPERIENCE**

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- Developed a web interface **RegAnalyst** that integrates **MoPP** (Motif Prediction Program), **MyPatternFinder** (pattern detection tool) and **MycoRegDB** (mycobacterial promoter and regulatory elements database).
- Current version of **MycoRegDB** has the unique ability of delineating regulatory **pathways** and building **networks**.
- Developed a web server **Spectral Repeat Finder (SRF)** for identification of repetitive sequences.
- Analyzed various mycobacterial genomes by **comparative genomics**.

- **Skills:** Linux/Unix/Windows, PERL/HTML, MySQL, R, Metagenomics, AutoDock, Modeller, PyMol, Delila (information theory-based models and sequence walkers), SOMO (hydrodynamic bead modeling), BLAST, ClustalW, TMPred, InterProScan, Primer3, MEGA (phylogenetic tree).

## **LABORATORY RESEARCH EXPERIENCE**

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- Constructed a **novel *M. tuberculosis* strain** (*devRAC-Compl*) that was found to be severely attenuated in guinea pigs suggesting its potential as a **vaccine**.
- Immunostaining for mycobacterial division and dormancy markers indicated that a fraction of bacilli enter the non-replicating persistent state during the early stages of infection.
- Showed that antigen staining combined with DNA analysis could be useful for the detection of intact (live) mycobacteria and for indicating the adequacy of chemotherapy in the absence of AFB staining in tissue sections.
- **Skills:** DNA cloning, Protein expression and purification, Working in BSL-3 facility, Animal handling/dissection (blood collection and giving *i.p./i.m./s.c.* injections), Electroporation, PCR/RT-PCR, EMSA, Phosphotransfer assays, Enzyme kinetics, Culturing bacterial strains, ELISA, Immunoblotting, Raising antisera, AFB staining, Immunofluorescence microscopy, Immunohistochemistry.

## **INVITED LECTURES**

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- National Symposium on ‘Innovation in TB Diagnostics, Drug Targets and Biomarkers’, 27-28 Jan 2014, JBTDRC, MGIMS, Sevagram, Wardha.
- Continuing Education Program on ‘From Functional Genomics to Systems Biology’, 23-27 Sept 2013, DIPAS, DRDO, New Delhi.
- Conference on Human Viruses and Translational Medicine, 17-18 Nov 2008, NII, New Delhi.
- National Seminar and Workshop on Bioinformatics and Computational Biology, 22-24 Mar 2006, BHU, Varanasi.

## **PROFESSIONAL TRAININGS/COURSES**

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- Attended the international workshop on ‘Bacterial microbiome analysis using 16S-rRNA bacterial database’, 16-20 December 2011.
- Attended the workshop on ‘Introduction to Nanotechnology and Its Emerging Role in Industries’, 24 Oct 2008.
- **Was selected among 12 students** to attend 11<sup>th</sup> ADNAT Convention training course on ‘Protein Structure Prediction and Structure Determination’, 26 Feb - 8 Mar 2007.
- **Was selected among 20 students from South East Asia** to attend WHO sponsored ‘South East Asian Training Course on Bioinformatics Applied to Tropical Diseases’, 28 Sept-11 Oct 2004.

## **TEACHING EXPERIENCE**

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- ‘Bioinformatics’, ‘Computer Programming’, ‘Computational Biology’ and ‘Computer Applications’ to B.Tech., M.Tech., M.Sc. and Ph.D. students (IIT Roorkee).
- ‘Computers’ and ‘Bioinformatics’ to M. Biotechnology students (AIIMS).
- ‘Bioinformatics’ to Ph.D. students (THSTI)

## **AWARDS AND RECOGNITIONS**

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- Conferred **Haryana Yuva Vigyan Ratna Award 2013-14** in May 2017.
- Founding member of INYAS (Indian National Young Academy of Science), 2015 - 2019.
- **INSA Medal for Young Scientist - 2008.**
- Postdoctoral Fellowship by Department of Biotechnology (DBT), Govt. of India in May 2006.
- **All India 1<sup>st</sup> rank** in Ph.D. (Biotechnology) entrance examination (2001) conducted by AIIMS, New Delhi.
- Qualified Joint CSIR-UGC Junior Research Fellowship (JRF) and eligibility for Lectureship - National Eligibility Test (NET) in May 2000.
- Awarded scholarship during M. Biotechnology (1998-2000) by Department of Biotechnology (DBT), Govt. of India.
- **All India 5<sup>th</sup> rank** in M. Biotechnology entrance examination (1998) conducted by AIIMS, New Delhi.
- **All India 2<sup>nd</sup> rank** in M.Sc.-Ph.D. combined entrance examination (1998) conducted by Dr. B.R. Ambedkar Center for Biomedical Research (ACBR), Delhi University, New Delhi.
- 'Merit Certificate' for National Mathematics Olympiad Contest 1991.