

RENU VERMA, Ph.D.

Stanford University, School of Medicine, Division of Infectious Diseases and Geographic Medicine

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Postdoctoral Research Fellow

June 2018-Present

Andrews Lab, Division of Infectious Diseases and Geographic Medicine

Stanford University School of Medicine

Stanford, California

Mentor & laboratory Head

Jason R. Andrews, MD, MS

Division of Infectious Diseases and Geographic Medicine

Stanford University School of Medicine

Research projects:

- Developing a multiplex qPCR-based rapid pharmacogenomic assay for *NAT2* polymorphisms to guide isoniazid dosing for treatment of tuberculosis
- Developing novel strategies and real time PCR-based assays for the detection of *M. tuberculosis* in the environment as a novel tool for identifying high-risk locations for tuberculosis transmission
- Analyzing host serum biomarkers in latent and active Tuberculosis using ELISA assays in patients as a measure of disease severity.

EDUCATION:

Degree	Doctor of Philosophy	Jan 2012 - Oct 2017
Field of study	Biotechnology	
Supervisor	Akhilesh Pandey, M.D; Ph.D. Founder and Director, Institute of Bioinformatics Professor, Senior Associate Consultant, Mayo Clinic, Laboratory Medicine and Pathology Rochester, MN, USA	
Institute/University	Institute of Bioinformatics Bangalore, India (Registered as a Ph.D. student at KIIT University, Bhubaneswar)	
Dissertation Title	Mass spectrometry-based investigation of protein phosphorylation and virulence determinants in <i>Mycobacterium tuberculosis</i>	
Degree	Master of Science (Biotechnology)	Sep 2008 - Jul 2010
Institute/University	University of Mysore, India	
Degree	Bachelor of Science (Biotechnology)	June 2004 - May 2007
Institute/University	Bangalore University, India	

TRAININGS & EXPERIENCE IN TUBERCULOSIS RESEARCH

1. Certification in Integrated training for high-containment BSL-3 laboratories at the UC-Irvine Center of Excellence and National Training Center, Irvine, California, USA
2. Training in handling and operating GeneXpert instrument for various assays and sample types at Cepheid, Sunnyvale, California, USA
3. National Reference laboratory (NRL)-BSL-3, National JALMA Institute for Leprosy and other Mycobacterial diseases, Indian Council of Medical Research (ICMR), Agra, India: Investigated the whole genomes of 200 *M. tuberculosis* clinical isolates with different drug resistance profiles including MDR and pre-XDR to identify novel drug resistance markers specific to Indian population.
Mentors: Dr. Srikanth Prasad Tripathy, Dr. T. S. Keshava Prasad, Dr. Akhilesh Pandey, Dr. D.S. Chauhan and Dr. Harsha Gowda
4. BSL-3 Facility, CSIR-Institute of Genomics and Integrative Biology (IGIB), New Delhi and Proteomics laboratory: Employed 8-plex tandem mass tag (TMT) peptide labeling and TiO₂-based phosphopeptide enrichment strategies to study the virulence determinants in *M. tuberculosis* using high resolution mass spectrometry.
Mentors: Dr. Sheetal Gandotra and Dr. T.S. Keshava Prasad
5. Department of Microbiology, Postgraduate Institute of Medical Education and Research (PGIMER), India. Analyzed whole genomes of extra-pulmonary TB clinical isolates to identify novel mutations separating extra-pulmonary TB from pulmonary TB.
Mentors: Dr. Akhilesh Pandey, Dr. Kusum Sharma, Dr. Harsha Gowda and Dr. T. S. Keshava
6. BSL-3 Facility, P. D. Hinduja National Hospital & Medical Research Centre, Mumbai, Maharashtra 400016, India. Received training in culturing and handling *M. tuberculosis* clinical isolates
Mentor: Dr. Camilla Rodrigues
7. BSL-3 Facility, SDS Tuberculosis & Rajiv Gandhi Institute of Chest Diseases, Bangalore, Karnataka: Optimized cultures for quantitative proteomic analysis of *Mycobacterium tuberculosis* reference strains
Mentor: Dr. Keshava Prasad
8. Command Hospital Air Force, Cambridge Rd, Cambridge Layout, Jogupalya, Bengaluru, Karnataka 560007, India. Interviewed patients with drug resistance TB about their experience and hardships in coping up with the disease during the treatment.
Mentor: Dr. Shankar Subramanian
9. Department of Microbiology and Cell Biology, IISc Bangalore. Worked as a Research assistant and received training in analyzing change in the levels of various cytokines in human PBMCs exposed to *M. tuberculosis* antigens using Multicolor Flowcytometry.
Mentor: Vijaya Satchidanandam

10. Microtest Innovations Pvt Ltd., International Tech Park, Whitefield Bangalore, India. Worked on development of an epitope-based diagnostic gadget for detection of *Mycobacterium tuberculosis* in the Indian population.

Mentor: Dr. Jayasuryan Narayana

Prior Projects: Worked as a lead Microbiologist and Molecular Biologist

Project title	Whole genome sequencing analysis of 200 <i>Mycobacterium tuberculosis</i> clinical isolates from north India	2014 - 2018
Investigators	Dr. Srikanth Prasad Tripathy, Dr. T. S. Keshava Prasad, Dr. Akhilesh Pandey, Dr. D.S. Chauhan, Dr. Harsha Gowda	
Funding	Indian Council of medical research, Govt. of India and Infosys Foundation	
Project title	Whole genome sequencing analysis of <i>Mycobacterium tuberculosis</i> isolated from various extrapulmonary sites	
Investigators	Dr. Kusum Sharma, Dr. Harsha Gowda and Dr. T. S. Keshava Prasad	
Funding	Infosys Foundation	2015 - 2017
Project title	Quantitative proteomic and phosphoproteomic analysis of H37Ra and H37Rv strains of <i>Mycobacterium tuberculosis</i> using high resolution mass-spectrometry	
Investigators	Dr. Sheetal Gandotra and Dr. T.S. Keshava Prasad	
Funding	Department of Biotechnology (DBT), Government of India and Infosys Foundation	2014 - 2016
Project title	Development of epitope based diagnostic gadget for detection of <i>Mycobacterium tuberculosis</i> in the Indian population	
Investigators	Dr. T. S. Keshava Prasad and Dr. N. Jayasuryan	
Funding	Department of Science and Technology, Govt. of India.	
Project title	Integrated multi-omic analysis of avirulent strain H37Ra of <i>Mycobacterium tuberculosis</i>	2012 - 2013
Investigators	Dr. Sheetal Gandotra and Dr. T.S. Keshava Prasad.	
Funding	Karnataka Biotechnology and Information Technology Services (KBITS) and Yenepoya University, Mangalore	

AWARDS AND SCHOLARSHIPS

- Awarded five-year scholarship from Council of Scientific and Industrial Research (CSIR) under University Grants Commission (UGC) scheme, Govt. of India for qualifying national entrance examination for Ph.D. support. All India rank: 65 **2011**
- Qualified National Eligibility test (NET) for Lectureship in the field of Life Science conducted by CSIR, Govt. of India **2011**

- Qualified All-India Graduate Aptitude Test in Engineering -GATE, Biotechnology, **2011**
for Ph.D. (98.3 percentile). All India rank: 225
- Awarded 6 months fellowship and contingency funds from BCIL (Biotech **2010**
Consortium India Limited), Department of Biotechnology (DBT), Govt. of India
- Awarded two years M.Sc. scholarship from Department of Biotechnology (DBT) **2008**
Govt. of India for qualifying national entrance examination. All India rank: 206
- Contingency support from Department of Biotechnology, Govt. of India for MSc. **2010**
dissertation project done at Triesta Sciences (R&D), HCG Hospitals Bangalore

PEER-REVIEWED PUBLICATIONS

1. Detection, survival and infectious potential of Mycobacterium tuberculosis in the environment: a review of the evidence and epidemiological implications *EUROPEAN RESPIRATORY JOURNAL*
Martinez, L., **Verma, R.**, Croda, J., Horsburgh, C., Walter, K. S., Degner, N., Middelkoop, K., Koch, A., Hermans, S., Warner, D. F., Wood, R., Cobelens, F., Andrews, J. R.2019; 53 (6)
2. Whole Genome Sequencing of Mycobacterium tuberculosis Clinical Isolates From India Reveals Genetic Heterogeneity and Region-Specific Variations That Might Affect Drug Susceptibility *FRONTIERS IN MICROBIOLOGY*
Advani, J., **Verma, R.**, Chatterjee, O., Pachouri, P., Upadhyay, P., Singh, R., Yadav, J., Naaz, F., Ravikumar, R., Buggi, S., Suar, M., Gupta, U. D., Pandey, A., Chauhan, D. S., Tripathy, S., Gowda, H., Prasad, T.2019; 10
(Shared first author)
3. Integrated Multi-Omic Analysis of Mycobacterium tuberculosis H37Ra Redefines Virulence Attributes. *Frontiers in microbiology*
Pinto, S. M., **Verma, R.**, Advani, J., Chatterjee, O., Patil, A. H., Kapoor, S., Subbannayya, Y., Raja, R., Gandotra, S., Prasad, T. S.2018; 9: 1314
(Shared first author)
4. Data on whole genome sequencing of extrapulmonary tuberculosis clinical isolates from India. *Data on whole genome sequencing of extrapulmonary tuberculosis clinical isolates from India.*
Advani, J., Sharma.K, **Verma, R.**, Chatterjee O, Solanki HS, Pandey.A., Gowda.H., Prasad. TSK2018
5. Rise of Clinical Microbial Proteogenomics: A Multiomics Approach to Nontuberculous Mycobacterium-The Case of Mycobacterium abscessus UC22. *Rise of Clinical Microbial Proteogenomics: A Multiomics Approach to Nontuberculous Mycobacterium-The Case of Mycobacterium abscessus UC22.*
Advani, J., **Verma, R.**, Chatterjee O, Gowda H, Prasad TSK, et al2018
(Shared first author)
6. Quantitative Proteomic and Phosphoproteomic Analysis of H37Ra and H37Rv Strains of Mycobacterium tuberculosis *JOURNAL OF PROTEOME RESEARCH*

Verma, R., Pinto, S. M., Patil, A. H., Advani, J., Subba, P., Kumar, M., Sharma, J., Dey, G., Ravikumar, R., Buggi, S., Satishchandra, P., Sharma, K., Suar, M., Tripathy, S. P., Chauhan, D. S., Gowda, H., Pandey, A., Gandotra, S., Prasad, T. S.2017; 16 (4): 1632-1645

7. Whole Genome Sequencing of Mycobacterium tuberculosis Isolates From Extrapulmonary Sites. *Omics : a journal of integrative biology*
Sharma, K., **Verma, R.**, Advani, J., Chatterjee, O., Solanki, H. S., Sharma, A., Varma, S., Modi, M., Ray, P., Mukherjee, K. K., Sharma, M., Dhillion, M. S., Suar, M., Chatterjee, A., Pandey, A., Prasad, T. S., Gowda, H.2017; 21 (7): 413–25
(Shared first author)
8. Integrating transcriptomic and proteomic data for accurate assembly and annotation of genomes *GENOME RESEARCH* Prasad, T. S., Mohanty, A. K., Kumar, M., Sreenivasamurthy, S. K., Dey, G., Nirujogi, R. S., Pinto, S. M., Madugundu, A. K., Pati, A. H., Advani, J., Manda, S. S., Gupta, M. K., Dwivedi, S. B., Kelkar, D. S., Hall, B., Jiang, X., Peery, A., Rajagopalan, P., Yelamanchi, S. D., Solanki, H. S., Raja, R., Sathe, G. J., Chavan, S., **Verma, R.**, Patel, K. M., Jain, A. P., Syed, N., Datta, K. K., Khan, A. A., Dammalli, M., Jayaram, S., Radhakrishnan, A., Mitchell, C. J., Na, C., Kumar, N., Sinnis, P., Sharakhov, I. V., Wang, C., Gowda, H., Tu, Z., Kumar, A., Pandey, A. All Authors 2017; 27 (1): 133-144
9. A network map of Interleukin-10 signaling pathway *JOURNAL OF CELL COMMUNICATION AND SIGNALING* **Verma, R.**, Balakrishnan, L., Sharma, K., Khan, A. A., Advani, J., Gowda, H., Tripathy, S. P., Suar, M., Pandey, A., Gandotra, S., Prasad, T. S., Shankar, S. 2016; 10 (1): 61-67
10. A network map of BDNF/TRKB and BDNF/p75NTR signaling system. *Journal of cell communication and signaling*
11. Sandhya, V. K., Raju, R., **Verma, R.**, Advani, J., Sharma, R., Radhakrishnan, A., Nanjappa, V., Narayana, J., Somani, B. L., Mukherjee, K. K., Pandey, A., Christopher, R., Prasad, T. S. 2013; 7 (4): 301-307
12. A multilectin affinity approach for comparative glycoprotein profiling of rheumatoid arthritis and spondyloarthritis. *Clinical proteomics* Bhattacharjee, M., Sharma, R., Goel, R., Balakrishnan, L., Renuse, S., Advani, J., Gupta, S. T., Verma, R., Pinto, S. M., Sekhar, N. R., Nair, B., Prasad, T. S., Harsha, H. C., Jois, R., Shankar, S., Pandey, A. 2013; 10 (1): 11-?
13. Proteomic analysis of purified protein derivative of Mycobacterium tuberculosis. *Clinical proteomics* Prasad, T. S., **Verma, R.**, Kumar, S., Nirujogi, R. S., Sathe, G. J., Madugundu, A. K., Sharma, J., Puttamalles, V. N., Ganjiwale, A., Myneedu, V. P., Chatterjee, A., Pandey, A., Harsha, H., Narayana, J. 2013; 10 (1): 8-?

ORAL PRESENTATIONS:

- **50th Union World Conference on Lung Health. Hyderabad, India. October 2019.**
Verma R, Middelkoop J, Degner N, Moreira F, da Silva Santos A, Martinez L, Patil S, Wood R, Croda J, Andrews J.R. Detection of *Mycobacterium tuberculosis* in the Environment as a Novel Tool for Identifying High-risk Locations for Tuberculosis Transmission.
- **50th Union World Conference on Lung Health. Hyderabad, India. October 2019.**
Renu Verma, Paulo Cesar Pereira dos Santos, Andrea da Silva Santos, Roberto Dias de Oliveira, Camila Camioli, Everton Ferreira Lemos, Eunice Atsuko Totumi Cunha, Christine Gonçalves, Jason R. Andrews, Julio Croda. **The utility of pooling sputum samples for mass screening for tuberculosis in prisons using Xpert® MTB/RIF Ultra**
- **National JALMA Institute for Leprosy and other Mycobacterial diseases, Indian Council of Medical Research (ICMR), Agra, India.**
Renu Verma and Jayshree Advani
Whole Genome Sequencing of *Mycobacterium tuberculosis* Clinical Isolates from India Reveals Genetic Heterogeneity and Region-Specific Variations That Might Affect Drug Susceptibility
- **SDS Tuberculosis & Rajiv Gandhi Institute of Chest Diseases, Bangalore, Karnataka.**
Renu Verma
Detection of *Mycobacterium tuberculosis*-specific peptides in sputum samples of patients suspected with *M. tuberculosis* infection using High-resolution mass-spectrometry.
- **Indian Institute of Science, Bangalore, India**
Renu Verma
Detection of *Mycobacterium tuberculosis*-specific peptides in sputum samples of patients suspected with *M. tuberculosis* infection using High-resolution mass-spectrometry.

POSTER PRESENTATION AND WORKSHOPS

1. **Verma, R.,** Proteomic analysis of Purified protein derivative of *Mycobacterium tuberculosis* reveals novel antigenic epitopes. 5th Annual Proteomics Society of India) I Meeting: November 28-30, 2013, Bangalore, India
2. **Verma, R.,** Quantitative proteomic and phosphoproteomic analysis of H37Ra and H37Rv strains of *Mycobacterium tuberculosis*. 6th Proteomics Society (India) Annual Meeting in 2014. IIT, Bombay
3. **Verma, R.,** Genomic landscape of extra-pulmonary tuberculosis clinical isolates from India. NextGen Genomics, Biology, Bioinformatics and Technologies (NGBT) Conference 2016 at Kochi, Kerala
4. Indo-US Workshop on “Epigenetic Regulation and Genome Control (Emphasis on RNAi and microRNA)”, conducted by Centre for Cellular and Molecular Biology (CCMB), Hyderabad, December 2009

5. Workshop on “Microarray data analysis and Systems Biology” conducted by Institute of Computational Biology, Bangalore Educational and training division from 1st September 2010 to 7th September 2010 in Bangalore
6. Workshop on immunological techniques conducted by Bangalore Genei India Pvt. Ltd. Held on 29th to 31st October 2009 at Teresian College Mysore

INTERNSHIPS

Position	MSc. Intern	Apr 2010 - Jun 2010
Project title	Detection of Expression Level, Amplification and Mutation of EGFR Gene in Non small Cell lung Cancer (NSCLC)	
Supervisor	Dr. Rashmita Sahoo, HOD Triesta R&D Laboratory	
Institute	Triesta R&D Laboratory, HCG Enterprises	
Funding	Department of Biotechnology, Govt. of India	
Position	Research trainee and BCIL Fellow	Sep 2010 - Jun 2011
Project title	Characterizing the potential biomarkers for cell types and various conditions of mouse and human testis, at the level of alternatively spliced form	
Supervisor	Dr. Kshitish Acharya, Director, Shodhaka life Sciences	
Institute	Shodhaka Life Sciences Pvt. Ltd., IBAB, Biotech Park, Bangalore, India	
Funding	Biotech Consortium India Limited (BCIL), Department of Biotechnology, Govt. of India	

AWARDS & HONORS

- Award for the best creative sketch in science, at 5th Annual Meeting of Proteomics Society of India, held at the Indian Institute of Science, Bangalore, India
- Secured third position in State level science quiz organized by Society of Biotechnologists held on 23rd March, 2009, University of Mysore, India
- Elected as the Joint Secretary of Science Society for the academic year 2004-2005 at the Garden city college, Bangalore University, India
- Recognized for active participation in the awareness program by SARD (Society for All Round Development), an initiative for HIV/AIDS preventive education, a joint initiative of Delhi govt. and UNESCO
- Indra Award by International Association of Educators for world peace (An Affiliate of UN – UNESCO, UNICEF, UNICED, UNDPI, ECOSOC) for active participation in social awareness programs conducted in underdeveloped regions of New Delhi

