

Meetali Singh, PhD

Post-doctoral Research

Jan 2017 – to date

Postdoc Researcher

Institut Pasteur, Department of Developmental and Stem Cell Biology
Paris, France

Project: **Regulation of germline transcripts by small RNAs in *C. elegans***

I am investigating the role of endo-siRNAs in gene regulation of *C. elegans* germline genes during development by integrating proteomic, biochemical, and high-throughput genomic approaches like RNA-seq, Gro-seq, Ribo-seq and small RNAseq. In particular my work focuses on elucidating mechanism of action of an essential argonaute, CSR-1, which regulates different subsets of its targets by either cleaving them to finetune their levels or by protecting another subset of targets from silencing pathways. Another aspect of my project is to understand the mechanism of biogenesis of CSR-1 loaded small RNAs

Advisor: Dr. Germano Cecere

Education

Aug 2011- Jan 2017

Ph.D. in Biochemistry (Integrated PhD program)

Department of Biochemistry, Indian Institute of Science
Bangalore, India

Thesis: **Novel facets of Heat Shock Protein 90 in neglected protozoan parasites.**

I worked on to understand the function of a chaperone Hsp90 in pathogenesis of protozoan parasites. I demonstrated that Hsp90s from early branching protozoa differ from higher eukaryotes in terms of their biochemical and cell biological properties as well as in the composition of their co-chaperone repertoire. Hsp90 inhibition is lethal for these parasites. Using different parasites like *Entamoeba*, *Trichomonas* and *Theileria* as models, I showed Hsp90 function was important for parasite growth and stage transition. Furthermore, using classical biochemistry couple with bioinformatic analysis I was able to demonstrate secretion of Hsp90 in extracellular media by *Trichomonas*.

Advisor: Prof. Utpal Tatu

Aug 2009 – July 2011

MS in Biological Sciences (Research, part of 7 -year Integrated PhD program)

Division of Biological Science, Indian Institute of Science
Bangalore, India

Project: **Biochemical characterization of the components of heat shock response machinery in *Plasmodium falciparum*.**

I was able to show that complementing *Saccharomyces cerevisiae* with *Plasmodium* Hsp90 was able to restore viability but not all cellular functions, highlighting the biochemical and functional difference between Hsp90 from a parasitic origin to that of yeast.

Advisor: Prof. Utpal Tatu

Aug 2006 – May 2009

B.Sc. (H) Biomedical Sciences

Bhaskaracharya College of Applied Sciences, University of Delhi

New Delhi, India

Project: Characterization of ABC transporter (rv1747) protein of *Mycobacterium tuberculosis* H37Rv (at Institute of Genomics and Integrative Biology, New Delhi, May- July 2008).

Advisor: Prof. Yogendra Singh

Awards & fellowships

Aug 2014- July 2015

Scholarship: Bristol-Myers Squibb fellowship

Nominated from Biological Science division, Indian Institute of Science

Oct 2015

Travel Award: Dept. of Science and Technology, Govt. of India for 7TH International conference on the Hsp90 chaperone machine meeting in Seeon, Germany.

Mar 2012

Award: DR. A. S. Perumal Award, Dept. of Biochemistry, Indian Institute of Science for excellent performance in PhD training and comprehensive examination

Aug 2011- July 2016

Scholarship: Junior and Senior Research fellowships, Council for Scientific and Industrial Research, India

Aug 2010- July 2011

Scholarship/Award: J Ganguly Memorial Award, Indian Institute of Science for excellent academic performance during M.S. course work.

Apr 2006- July 2010

Scholarship: Kishore Vaigyanik Protsahan Yojana (KVPY), Department of Science and Technology, India.

Other projects

Development of ELISA based diagnostic method for sero-surveillance of *Trypanosoma evansi* infection in horse in India. (As an additional project during PhD tenure in Prof. Utpal Tatu's lab) 2013-2014. (Test already in use for clinical samples)

Summer internship project: Cloning, purification and bioinformatics analysis of novel GTP binding protein Era of *Mycobacterium tuberculosis* H37Rv

Advisor: Prof Yogendra Singh, Institute of Genomics and Integrative Biology, New Delhi, May- July 2009

Summer internship project: Understanding molecular biology techniques

Advisor: Prof. Sandhya S Vishveshwariah, Indian Institute of Science, Bangalore, Jun 2007

Mentoring

June – July 2011: Parna Saha, Masters summer intern from University of Calcutta

June- July 2012: Sharanya Jayaraman , Masters summer intern from Sastra college and university

Jan- Jul 2013: Vaishali Singhal, Masters intern

Aug 2015- July 2016: Niharika Mekala , undergraduate student at Indian Institute of Science, Bangalore, co-author on a manuscript.

January- July 2016: Nitya Sarjapuram, Masters thesis intern, co-author on a manuscript.

July – Aug 2017: Zoe Lee-Chiong, undergraduate summer intern from Stanford University

July – Aug 2019: Simone Proccacia, undergraduate Amgen scholar

Publications

Publications related to PhD research

Research articles- primary publications

1. **Singh M**, Beri D, Nageshan RK, Chavaan L, Gadara D, Poojary M, Subramaniam S, Tatu U. A secreted Heat shock protein 90 of *Trichomonas vaginalis*. *PLoS Negl Trop Dis*. 2018 May 16;12(5):e0006493.

2. Raman S*, **Singh M***, Tatu U, Suguna K. First Structural View of a Peptide Interacting with the Nucleotide Binding Domain of Heat Shock Protein 90. *Sci Rep*. 2015 Nov 24;5:17015.

***Equal contribution**

3. **Singh M**, Sharma S, Bhattacharya A, Tatu U. Heat Shock Protein 90 regulates encystation in *Entamoeba*. *Front Microbiol*. 2015 Oct 13;6:1125.
4. **Singh M**, Shah V, Tatu U. A novel C-terminal homologue of Aha1 co-chaperone binds to heat shock protein 90 and stimulates its ATPase activity in *Entamoeba histolytica*. *J Mol Biol*. 2014 Apr 17;426(8):1786-98.

Research articles- collaborative publications

5. Kinnaird JH, **Singh M**, Gillan V, Weir W, Calder ED, Hostettler I, Tatu U, Devaney E, Shiels BR. Characterization of HSP90 isoforms in transformed bovine leukocytes infected with *Theileria annulata*. *Cell Microbiol*. 2017 Mar;19(3).
6. Yadav SC, Kumar R, Kumar J, **Singh M**, Bera BC, Kumar R, Tatu U, Tehri K. Antigenic characterization of 52-55kDa protein isolated from *Trypanosoma evansi* and its application in detection of equine trypanosomosis. *Res Vet Sci*. 2017 Oct;114:455-460.
7. Sarjapuram N, Mekala N, **Singh M**, Tatu U. The Potential of *Lactobacillus casei* and *Enterococcus faecium* Combination as a Preventive Probiotic Against *Entamoeba*. *Probiotics Antimicrob Proteins*. 2017 Jun;9(2):142-149.
8. Sayeed SK, Shah V, Chaubey S, **Singh M**, Alampalli SV, Tatu U. Identification of heat shock factor binding protein in *Plasmodium falciparum*. *Malar J*. 2014 Mar 27;13:118.

Review articles

9. Rochani AK, Mithra C, **Singh M#**, Tatu U. Heat shock protein 90 as a potential drug target against surra. *Parasitology*. 2014 Aug;141(9):1148-55.

#Corresponding author

10. Rochani AK, **Singh M**, Tatu U. Heat shock protein 90 inhibitors as broad spectrum anti-infectives. *Curr Pharm Des*. 2013;19(3):377-86.

Book Chapters

11. Rochani A, **Singh M**, Tatu U. Heat-shock Protein 90 as an Antimalarial Target. *Inhibitors of Molecular Chaperones as Therapeutic Agents*, Edited by Timothy D Machajewski, Zhenhai Gao, 01/2014: pages 379-391; Royal Society of Chemistry., ISBN: 978-1-84973-666-4

Conference Abstracts

1. **Singh M**, Cornes E, Li B, Quarato P, Dingli F, Loew D, Didier C, Cecere G. CSR-1 catalytic-dependent and -independent activity on germline transcriptome. 22nd International *C. elegans* conference, UCLA, Los Angeles. 2019.
2. **Singh M**, Cornes E, Li B, Quarato P, Dingli F, Loew D, Didier C, Cecere G. Regulation of germline transcripts by small RNAs in *C. elegans*. RNA in epigenetic and chromatin regulation conference, Institut Pasteur, Paris. 2019.
3. **Singh M**, Shah V and Tatu U. Identification of a novel Heat Shock Protein 90 co-chaperone, EhAha1c, from *Entamoeba histolytica*. 7TH International conference on the Hsp90 chaperone machine, Seeon, Germany. 2014.
4. **Singh M**, Picard D, and Tatu U. Functional characterization of *Plasmodium falciparum* Hsp90 complemented yeast. 5TH Annual meeting of Proteomics Society of India, National Institute of Advanced Studies (NIAS). 2013.