Amit Singh, Ph.D
Associate Professor
Department of Microbiology and Cell Biology
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Academic Qualification

S.No	Degree	Year	Subject	University	% of Marks
1	B. Sc	1996	Microbiology	Delhi	62 %
2	M. Sc	1998	Biotechnology	IIT Roorkee	76.8%
3	Ph. D	2004	Biochemistry	Delhi	-

Ph.D
Thesis Title: Gene Regulation and Pathogenesis in *Mycobacterium tuberculosis*
Guide Name: Prof. Anil K. Tyagi, University: Delhi University; Year of award: 2004

Work experience

S.No	Position	Institution Place	From (Date)	To (date)
1	Associate Professor	Indian Institute of Science, Bangalore	July 2018	To-date
1	Assistant Professor	Indian Institute of Science, Bangalore	February, 2014	June-2018
2	Wellcome-DBT Intermediate Fellow	International Centre for Genetic Engineering and Biotechnology, New Delhi	May, 2010	January, 2014
3	Post-Doc Research Work	University of Alabama at Birmingham, USA	August, 2004	April, 2010

Professional Recognition

S.No	Name of the Award	Award Agency	Year
1	Wellcome Trust–DBT India Alliance Intermediate Award	Wellcome Trust UK–DBT India Alliance	2010
2	Concepts and Novel Ideas in HIV Research (CNIHR)	NIH, USA	2010
3	Innovative Young Biotechnologist Award (IYBA)	DBT	2011
4	Merck Millipore India Innovation Award	Merck Millipore	2012
5	Senior Innovative Biotechnologist Award	DBT	2014
6	NASI-Scopus Young Scientist Award	Scopus-Elsevier-NASI	2016
7	Wellcome-DBT India Alliance Senior Award	Wellcome Trust UK-DBT India	2016
8	Elected Member, Guha Research Council		2017
9	National Bioscience Award for Career Development	DBT	2018

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10	CDRI- Drug Research Award	CSIR	2019
11	Shanti Swarup Bhatnagar Award	CSIR	2021
12	Life member, Society of Biological Chemists (India), Bangalore, India		
13	Society for Free Radical Biology and Medicine, USA		

Publications

1. Shytaj IL, Procopio AF, Tarek M, Carlon-Andres I, Tang HY, Goldman AR, Munshi MH, Pal VK, Forcato M, Sreeram S, Leskov K, Ye F, Lucic B, Cruz N, Ndhlovu LS, Bicciato S, Padilla-Parra S, Diaz RS, **Singh A**, Lusic M, Karn, Alvarez-Carbonell D and Savarino A. Glycolysis downregulation is a hallmark of HIV-1 latency and sensitizes infected cells to oxidative stress. ***EMBO Mol Med***. 2021. e13901.
2. Biji A, Khatun O, Swaraj S, Narayan R, Rajmani R, Sardae R, Satish D, Mehta S, Bindhu H, Jeevan M, Saini D, **Singh A**, Gupta D and Tripathi S. Identification of COVID-19 prognostic markers and therapeutic targets through meta-analysis and validation of Omics data from nasopharyngeal samples. ***EBioM***. 2021. 70: 103525
3. Anand K, Tripathi A, Shukla K, Malhotra N, Jamithireddy AK, Jha RK, Chaudhury SN, Rajmani RS, Ramesh A, Nagaraja V, Gopal B, Nagaraju G, Seshayee ASN, **Singh A**. *Mycobacterium tuberculosis* SufR Responds to Nitric oxide via its 4Fe-4S cluster and Regulates Fe-S cluster Biogenesis for Persistence in Mice. ***Redox Biol***. 2021. 102062.
4. Ravichandran S, Banerjee U, Devi GDR, Kandukuru R, Thakur C, Chakravortty D, Balaji KN, **Singh A** and Chandra N. VB10, a new blood biomarker for differential diagnosis and recovery monitoring of acute viral and bacterial infections. ***EBioM***. 2021. 67: 103352.
5. Das M, Dewan A, Shee S and **Singh A**. The Multifaceted Bacterial Cysteine Desulfurases: From Metabolism to Pathogenesis. ***Antioxidants***. 2021. 10: 997
6. Banerjee U, Baloni P, **Singh A** and Chandra N. Immune Subtyping in Latent Tuberculosis. ***Front Immunol***. 2021. 12: 595746.
7. Nukathoti S, Nikitha H, Singh S, **Singh A**, Mamannamana V and Surolia A. *Mevo* lectin specificity towards high-mannose structures with terminal αMan(1,2)αMan residues and its implication to inhibition of the entry of *Mycobacterium tuberculosis* into macrophages. ***Glycobiology***. 2021. cwab022.
8. Singh S, Ghosh S, Pal VK, Munshi MH, Shekhar P, Murthy DTN, Mugesh G and **Singh A.** Antioxidant nanozyme counteracts HIV-1 by modulating intracellular redox potential. ***EMBO Mol Med***. 2021. e13314.
9. Mishra R, Yadav V, Guha M and **Singh A**. Heterogeneous Host–Pathogen Encounters Coordinate Antibiotic Resilience in *Mycobacterium tuberculosis. Trends Microbiol. 2020. S0946-842.*
10. Banerjee U, Sankar S, **Singh A** and Chandra N. A Multi-pronged computational pipeline for prioritizing drug target strategies for latent tuberculosis. ***Front Chem***. 2020. 8: 593497.
11. Bhaskar A, Kumar S, Khan MZ, **Singh A**, Dwivedi VP and Nandicoori VK. Host sirtuin 2 as an immunotherapeutic target against tuberculosis. ***elife***. 2020. 9: e55415.

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12. Sachdeva K, Goel M, Sudhakar M, Mehta M, Raju R, Raman K, **Singh A** and Sundaramurthy V. *Mycobacterium tuberculosis* (*Mtb*) lipid-mediated lysomal rewiring in infected macrophages modulates intracellular *Mtb* trafficking and survival. ***J Bio Chem***. RA120: 012809.
13. Tyagi P, Pal V, Agrawal R, Srinivasan S, Singh, S and **Singh A**. *Mycobacterium tuberculosis* reactivates HIV-1 via exosomes-mediated resetting of cellular redox potential and bioenergetics. ***mBio.*** 2020. 11: e03293.
14. Mishra R, Kohli S, Malhotra N, Bandhyopadhyay P, Mehta M, Munshi M, Adiga V, Ahuja VK, Shandil RK, Rajmani RS, Seshasayee ASN and **Singh A**. Targeting redox heterogeneity to counteract drug tolerance in replicating *Mycobacterium tuberculosis*. ***Sci Transl Med.*** 2019. 11: eaaw6635.
15. Sutar YB, Mali JK, Telvekar VN, Rajmani RS and **Singh A**. Transferrin conjugates of antitubercular drug isoniazid: Synthesis and in vitro efficacy. ***Eur J Med Chem***. 2019. 183:111713.
16. Verma T, Podder S, Mehta M, Singh S, **Singh A**, Umapathy S and Nandi D. Raman spectroscopy reveals distinct differences between two closely related bacterial strains, *Mycobacterium indicus pranii* and *Mycobacterium intracellulare*. ***Anal Bioanal Chem***. 2019. 411: 7997–8009.
17. Mehta M, Agarwal N and **Singh A**. *Mycobacterium tuberculosis* WhiB3 maintains redox homeostasis and survival in response to reactive oxygen and nitrogen species. ***Free Radic Biol Med***. 2018. 27(131): 50-58.
18. Mahadik K, Prakhar P, Rajmani RS, **Singh A** and Balaji KN. c-Abl-TWIST1 Epigenetically Dysregulate Inflammatory Responses during Mycobacterial Infection by Co-Regulating Bone Morphogenesis Protein and miR27a. ***Front Immunol***. 2018. 1(9): 85. eCollection.
19. **Singh A** and Surolia A. Tuberculosis: Today's researches-tomorrow's therapies. ***IUBMB Life***. 2018. 70(9): 814-817.
20. Libardo MDJ, de la Fuente-Nuñez C, Anand K, Krishnamoorthy G, Kaiser P, Pringle SC, Dietz C, Pierce S, Smith MB, Barczak A, Kaufmann SHE, **Singh A** and Angeles-Boza AM. Phagosomal Copper-Promoted Oxidative Attack on Intracellular *Mycobacterium tuberculosis*. ***ACS Infect Dis***. 2018. 4(11): 1623 – 1634.
21. Chawla M, Mishra S, Anand K, Parikh P, Mehta M, Vij M, Verma T, Singh P, Jakkala K, Verma HN, AjitKumar P, Ganguli M, Narain Seshasayee AS and **Singh A**. Redox-dependent condensation of the mycobacterial nucleoid by WhiB4. ***Redox Biol***. 2018. 13(19): 116-133.
22. Sikri K, Duggal P, Kumar C, Batra SD, Vashist A, Bhaskar A, Tripathi K, Sethi T, **Singh A** and Tyagi JS. Multifaceted remodeling by vitamin C boosts sensitivity of *Mycobacterium tuberculosis* subpopulations to combination treatment by anti-tubercular drugs. ***Redox Biol***. 2018. 15: 452-466.
23. Pal VK, Bandyopadhyay P and **Singh A**. Hydrogen sulfide in physiology and pathogenesis of bacteria and viruses. ***IUBMB Life***. 2018. 70 (5): 393-410.
24. Mishra S, Shukla P, Bhaskar A, Anand K, Baloni P, Jha RK, Mohan A, Rajmani RS, Nagaraja V, Chandra N and **Singh A**. Efficacy of β-lactam/β-lactamase inhibitor combination is linked to WhiB4-mediated changes in redox physiology of *Mycobacterium tuberculosis*. ***Elife***. 2017. 26(6): e25624.

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25. Khan MZ, Bhaskar A, Upadhyay S, Kumari P, Rajmani RS, Jain P, **Singh A**, Kumar D, Bhavesh NS and Nandicoori VK. Protein kinase G confers survival advantage to *Mycobacterium tuberculosis* during latency-like conditions. ***J Biol Chem***. 2017. 292(39): 16093-16108.
26. Shukla P, Khodade VS, SharathChandra M, Chauhan P, Mishra S, Siddaramappa S, Pradeep BE, **Singh A** and Chakrapani H. "On demand" redox buffering by H_2S contributes to antibiotic resistance revealed by a bacteria-specific H_2S donor. ***Chem Sci***. 2017. 8(7): 4967-4972.
27. Sambarey A, Devaprasad A, Baloni P, Mishra M, Mohan A, Tyagi P, **Singh A**, Akshata JS, Sultana R, Buggi S and Chandra N. Meta-analysis of host response networks identifies a common core in tuberculosis. ***NPJ Syst Biol Appl***. 2017. 10(3): 4.
28. Padiadpu J, Baloni P, Anand K, Munshi M, Thakur C, Mohan A, **Singh A** and Chandra N. Identifying and Tackling Emergent Vulnerability in Drug-Resistant Mycobacteria. ***ACS Infect Dis***. 2016. 2(9): 592-607.
29. Holla S, Prakhar P, Singh V, Karnam A, Mukherjee T, Mahadik K, Parikh P, **Singh A**, Rajmani RS, Ramachandra SG and Balaji KN. MUSASHI-Mediated Expression of JMJD3, a H3K27me3 Demethylase, Is Involved in Foamy Macrophage Generation during Mycobacterial Infection. ***PLoS Pathog***. 2016. 12(8): e1005814.
30. Palmer CS, Henstridge DC, Yu D, **Singh A**, Balderson B, Duette G, Cherry CL, Anzinger JJ, Ostrowski M and Crowe SM. Emerging Role and Characterization of Immunometabolism: Relevance to HIV Pathogenesis, Serious Non-AIDS Events, and a Cure. ***J Immunol***. 2016.196(11): 4437-44.
31. Palmer CS, Cherry CL, Sada-Ovalle I, **Singh A** and Crowe SM. Glucose Metabolism in T Cells and Monocytes: New Perspectives in HIV Pathogenesis. ***EBioMedicine***. 2016. 6: 31-41.
32. Mehta M, Rajmani RS and **Singh A**. *Mycobacterium tuberculosis* WhiB3 Responds to Vacuolar pH-induced Changes in Mycothiol Redox Potential to Modulate Phagosomal Maturation and Virulence. ***J Biol Chem***. 2016. 291(6): 2888-903.
33. Palde PB, Bhaskar A, Pedró Rosa LE, Madoux F, Chase P, Gupta V, Spicer T, Scampavia L, **Singh A** and Carroll KS. First-in-Class Inhibitors of Sulfur Metabolism with Bactericidal Activity against Non-Replicating *M. tuberculosis*. ***ACS Chem Biol***. 2016. 11(1): 172-84.
34. Anand A, Verma P, Singh AK, Kaushik S, Pandey R, Shi C, Kaur H, Chawla M, Elechalawar CK, Kumar D, Yang Y, Bhavesh NS, Banerjee R, Dash D, **Singh A**, Natarajan VT, Ojha AK, Aldrich CC and Gokhale RS. Polyketide Quinones Are Alternate Intermediate Electron Carriers during Mycobacterial Respiration in Oxygen-Deficient Niches. ***Mol Cell***. 2015. 60(4): 637-50.
35. Chandra P, Ghanwat S, Matta SK, Yadav SS, Mehta M, Siddiqui Z, **Singh A** and Kumar D. *Mycobacterium tuberculosis* Inhibits RAB7 Recruitment to Selectively Modulate Autophagy Flux in Macrophages. ***Sci Rep***. 2015. 5: 16320.
36. Sharma S, Rajmani RS, Kumar A, Bhaskar A, **Singh A**, Manivel V, Tyagi AK and Rao KV. Differential proteomics approach to identify putative protective antigens of *Mycobacterium tuberculosis* presented during early stages of macrophage infection and their evaluation as DNA vaccines. ***Indian J Exp Biol***. 2015. 53(7): 429-39.

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37. Tyagi P, Dharmaraja AT, Bhaskar A, Chakrapani H and **Singh A**. *Mycobacterium tuberculosis* has diminished capacity to counteract redox stress induced by elevated levels of endogenous superoxide. ***Free Radic Biol Med***. 2015. 84: 344-354.
38. Kumar S, Vendruscolo M, **Singh A**, Kumar D and Samal A. Analysis of the hierarchical structure of the *B. subtilis* transcriptional regulatory network. ***Mol Biosyst***. 2015. 11(3): 930-41.
39. Bhaskar A, Munshi M, Khan SZ, Fatima S, Arya R, Jameel S and **Singh A**. Measuring glutathione redox potential of HIV-1-infected macrophages. ***J Biol Chem***. 2015. 290(2): 1020-38.
40. Bhaskar A, Chawla M, Mehta M, Parikh P, Chandra P, Bhave D, Kumar D, Carroll KS and **Singh A**. Reengineering redox sensitive GFP to measure mycothiol redox potential of *Mycobacterium tuberculosis* during infection. ***PLoS Pathog***. 2014. 10(1): e1003902.
41. Chawla M, Parikh P, Saxena A, Munshi M, Mehta M, Mai D, Srivastava AK, Narasimhulu KV, Redding KE, Vashi N, Kumar D, Steyn AJ and **Singh A**. *Mycobacterium tuberculosis* WhiB4 regulates oxidative stress response to modulate survival and dissemination in vivo. ***Mol Microbiol***. 2012. 85(6): 1148-65.
42. Karim AF, Chandra P, Chopra A, Siddiqui Z, Bhaskar A, **Singh A** and Kumar D. Express path analysis identifies a tyrosine kinase Src-centric network regulating divergent host responses to *Mycobacterium tuberculosis* infection. ***J Biol Chem***. 2011. 286(46): 40307-19.
43. Farhana A, Guidry L, Srivastava A, **Singh A**, Hondalus MK and Steyn AJ. Reductive stress in microbes: implications for understanding *Mycobacterium tuberculosis* disease and persistence. ***Adv Microb Physiol***. 2010. (57): 43-117.
44. **Singh A**, Crossman DK, Mai D, Guidry L, Voskuil MI, Renfrow MB and Steyn AJ. *Mycobacterium tuberculosis* WhiB3 maintains redox homeostasis by regulating virulence lipid anabolism to modulate macrophage response. ***PLoS Pathog***. 2009. 5(8):e1000545.
45. **Singh A**, Guidry L, Narasimhulu KV, Mai D, Trombley J, Redding KE, Giles GI, Lancaster JR Jr and Steyn AJ. *Mycobacterium tuberculosis* WhiB3 responds to O2 and nitric oxide via its [4Fe-4S] cluster and is essential for nutrient starvation survival. ***Proc Natl Acad Sci USA***. 2007.104(28): 11562-7.
46. **Singh A**, Mai D, Kumar A and Steyn AJ. Dissecting virulence pathways of *Mycobacterium tuberculosis* through protein-protein association. ***Proc Natl Acad Sci USA***. 2006. 103(30): 11346-51.
47. Singh R, **Singh A** and Tyagi AK. Deciphering the genes involved in pathogenesis of *Mycobacterium tuberculosis*. ***Tuberculosis*** (Edinb). 2005. 85(5-6): 325-35.
48. **Singh A**, Gupta R, Vishwakarma RA, Narayanan PR, Paramasivan CN, Ramanathan VD and Tyagi AK. Requirement of the mymA operon for appropriate cell wall ultrastructure and persistence of *Mycobacterium tuberculosis* in the spleens of guinea pigs. ***J Bacteriol***. 2005. 187(12): 4173-86.
49. Deol P, Vohra R, Saini AK, **Singh A**, Chandra H, Chopra P, Das TK, Tyagi AK and Singh Y. Role of *Mycobacterium tuberculosis* Ser/Thr kinase PknF: implications in glucose transport and cell division. ***J Bacteriol***. 2005. 187(10): 3415-20.
50. Singh R, Rao V, Shakila H, Gupta R, Khera A, Dhar N, **Singh A**, Koul A, Singh Y, Naseema M, Narayanan PR, Paramasivan CN, Ramanathan VD and Tyagi AK.

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Disruption of mptpB impairs the ability of *Mycobacterium tuberculosis* to survive in guinea pigs. ***Mol Microbiol***. 2003. 50(3): 751-62.

51. **Singh A**, Jain S, Gupta S, Das T and Tyagi AK. mymA operon of *Mycobacterium tuberculosis*: its regulation and importance in the cell envelope. ***FEMS Microbiol Lett***. 2003. 227(1): 53-63.

Patents

1. Mycobacterial disease detection, treatment, and drug discovery, US201440163078A1
2. Biosensor for detection of mycothiol redox potential, PCT/IN2014/0000316, Document number 14798377
3. Shortening tuberculosis therapy and reducing relapse by co-administering chloroquine in TB and HIV-TB co-infected individuals (Applied), 201941045667

Setting up the Biosafety Level –III facility at IISc:

To promote basic and translational research pertaining to infectious diseases such as tuberculosis in IISc, the institute needs a fully functional state-of-the art biosafety level –III facility. Amit actively took up the challenge of setting up a state-of-the-art BSL3 facility at IISc. He is managing the BSL3 facility from last 6 years. Due to his efforts, IISc has a fully functionalized the facility and successfully infected mice and guinea pigs with calibrated doses of aerosolized *Mtb*. The BSL3 facility at IISc is accessible to all bona fide TB research workers at the Institute. This facility is made available to the TB researchers from any academic or private institutes in India, which may foster many more interactions between governmental and private organizations.

Setting up a COVID19 testing facility at IISc:

Comprehensive testing is a key weapon in the battle against infectious diseases including coronavirus. This can quickly track and contain new outbreaks. Generally, these testing efforts are the work of central and state government, but both testing capacity, trained personnel, and state-of-the-art BSL3/BSL2 labs are inadequate amid a global pandemic like COVID19. Amit has dedicated his effort to develop a fully functional COVID 19 testing facility at IISc. He is the nodal officer for testing COVID19 samples at IISc. The facility is operational from May. 2020 and so far, tested 20000 samples by RT-PCR. The facility at CIDR-IISc is actively helping Karnataka government in testing. Since IISc is a research institute, the clinical samples generated during testing will be an excellent resource to carry out fundamental and translational research to understand the disease mechanisms, epidemiology, strain variations and translate findings to develop new drugs, diagnostics, and vaccines.