BIOGRAPHICAL SKETCH

NAME: Amit Singh

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POSITION TITLE: Professor, Department of Microbiology and Cell Biology, Centre for Infectious Disease Research, Indian Institute of Science, Bengaluru - 560012

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE	Completion Date MM/YYYY	FIELD OF STUDY
University of Delhi, India	B. Sc	Jul 1996	Microbiology
IIT Roorkee, India	M. Sc	Jul 1998	Biotechnology
University of Delhi, India	Ph. D	Sep 2004	Biochemistry
University of Alabama at Birmingham, USA	Post-Doc Research Work	Apr 2010	Tuberculosis dormancy

A. Personal Statement:

The unique ability of *Mycobacterium tuberculosis* to enter into a phase of "persistence" has made it necessary for humankind to suffer months to years of toxic specialized drugs to achieve treatment cure from TB. The physiological and molecular basis of this state of "persistence" is the proverbial holy grail of research on TB. It is this challenging area of research that my group has taken head-on in his pursuit of science, using some brilliantly novel tools and approaches with significant success. We developed and deploying a novel tool Mrx1-roGFP2 and identified the role of redox heterogeneity within intraphagosomal *Mtb* in countering the action of anti-TB drugs. Our team excelled at dissecting the basic mechanisms underlying drug tolerance in *Mtb*. The result was the discovery of a drug (chloroquine) that could be repurposed to ultimately accelerate tuberculosis (TB) treatment**.** Future work will be to discover and target bacterial and host mechanisms underlying redox heterogeneity to shorten TB therapy time. We plan to powerfully combine genetic (Transposon/CRISPR), structural (Cryo-EM), biochemical (seahorse XF analyzer), omics (RNA-seq, metabolomics) and animal models to identify pathways/processes required by *Mtb* for maintaining reductive cytoplasmic environment and tolerate drugs. We are also interested in exploring redox basis of HIV latency and reactivation. Over the years, we precisely quantified redox changes promoting entry into and exit from latency. Our group used several biosensors, cell lines, high throughput assays, artificial nanozymes, and clinical samples from people living with HIV to understand how redox, mitochondrial bioenergetics, and gasotransmitters coordinate HIV latency. In January 2014, I joined Indian Institute of Science (IISc), Bengaluru, India, in the Department of Microbiology and Cell Biology as an Assistant Professor. In 2016, I received funding from Wellcome trust /DBT IA, Senior Fellowship to continue my research on the fascinating areas of TB. In 2018, I was promoted to Associate Professor, and received the prestigious National Bioscience award for Career Development to understand HIV-1 persistence and reactivation. CSIR- CDRI in 2019 awarded the CDRI awards for excellence in Drug Research. CSIR in 2021 awarded prestigious Shanti Swarup Bhatnagar Award. Further in my research career, I am collaborating with multiple industry partners;

i) **Biom Pharmaceutical Corporation, Sarasota, Florida**: Preclinical Efficacy of PS121, An Antiviral Formulation, Against SARS-CoV2.

ii) **OmiX Research and Diagnostics Laboratories, Bengaluru, India**: Development of LAMP colorimetric kits for diagnosis of Tuberculosis, COVID and Influenza.

iii) **OmiX Research and Diagnostics Laboratories, Bengaluru, India**: To detect drug-resistant *Mycobacterium tuberculosis* in specimens (Sputum) from TB patients using redox bioprobe, Mrx1-roGFP2 which was developed by my group, (completed).

iv) **Foundation for Neglected Disease Research (FNDR), Bengaluru, India:** Small molecules/drugs identified by my group are taken up by FNDR to perform pre-clinical trials and pharmacological/toxicological studies. Since many drugs are already in use for other clinical indications, thus anticipating very good potential of these compounds in targeting drug-resistant MTB, (completed).

v) **Dr Geetanjali's HealthCare Center Private Limited, Pune, India:** To understand the effect of a novel maturation-inhibitor (MI) in HIV-1 replication.

B. Positions and Honors.

Positions

2004 – 2010	Post-Doctoral Research Fellow, University of Alabama, USA
2010 – 2014	Wellcome trust DBT/IA Intermediate Fellow, International Centre for Genetic Engineering and Biotechnology, New Delhi
2014 – 2018	Assistant Professor, Department of Microbiology and Cell Biology, Centre for Infectious Disease Research, Indian Institute of Science, Bengaluru
2018 – 2024	Associate Professor, Department of Microbiology and Cell Biology, Indian Institute of Science, Centre for Infectious Disease Research, Bengaluru
2024 – Till date	Professor, Department of Microbiology and Cell Biology, Indian Institute of Science, Centre for Infectious Disease Research, Bengaluru

Honors

2024	**Indian Institute of Science:** Research Award
2023	**Department of Biotechnology**: Tata Innovation Fellowship
2023	**Dr Joseph Thomas Memorial Science Club**: 15th Joseph Thomas Memorial Award Lecture, IIT Madras
2021	**Fellow, National Academy of Sciences**, India
2021	**Indian Institute of Science:** Revati & Satya Nadham Atluri Chair Award
2021	**Council of Scientific & Industrial Research:** Shanti Swarup Bhatnagar Award
2019	**Council of Scientific & Industrial Research:** CDRI Awards for Excellence in Drug Research
2018	**Guha Research Council:** Elected Member, Guha Research Council
2018	**Department of Biotechnology:** National Bioscience Award for Career Development
2016	**Wellcome Trust – India Alliance:** Senior Award
2016	**National Academy of Science: India:** NASI-Scopus Young Scientist Award
2012	**Department of Biotechnology:** Senior Innovative Young Biotechnologist Award
2012	**Merck:** Merck Millipore Innovation Award
2012	**Department of Biotechnology:** Innovative Young Biotechnologist Award
2010	**Wellcome Trust–India Alliance:** Intermediate Award
2010	**International AIDS Society:** Concepts and Novel Ideas in HIV Research (CNIHR)

Patents

- **Mycobacterial disease detection, treatment, and drug discovery** (US201440163078A1)
- **Biosensor for detection of mycothiol redox potential** (PCT number: PCT/IN2014/0000316; document number: 14798377).
- **Shortening tuberculosis therapy and reducing relapse by co-administering chloroquine in TB and HIV-TB co-infected individuals**. Indian Patent Application filed on 9th November 2019, Application # 201941045667.
- **Composition and methods for managing viral infections/diseases (IP59400, Indian Patent filed).**

C. Contribution to Science:

Complete list of publications

**** Work is completely conceived, executed, and published under my supervision as senior corresponding author
*** Significant part of work (~ 50-60%) is conceived, executed, and published under my supervision as senior corresponding author**.**

Publication in 2024

1. * Manna S, Agrawal R, Yadav T, Kumar TA, Kumari P, Dalai A, Kanade S, Balasubramanian N, Singh A, Chakrapani H. Orthogonal Persulfide Generation through Precision Tools Provides Insights into Mitochondrial Sulfane Sulfur. ***Angew Chem Int Ed Engl***. 2024. 2: e202411133
2. * Dewan A, Jain C, Das M, Tripathi A, Sharma AK, Singh H, Malhotra N, Seshasayee ASN, Chakrapani H, Singh A. Intracellular peroxynitrite perturbs redox balance, bioenergetics, and Fe-S cluster homeostasis in *Mycobacterium tuberculosis.* ***Redox Biol***. 2024. 75: 103285
3. Prabhakar S, Lin QXX, Rajagopalan D, Gamage AM, Le Tan M, Venkatesh P, Chan WOY, Dilip Kumar, Agrawal R, Chen Y, Fong SW, **Singh A**, Sun JL, Tan SY, Chai L, Somani J, Lee B, Laurent Renia, Lisa Ng, Kollengode Ramanathan, Lin-Fa Wang, Barnaby E Young, David Lye, and Singhal A. Longitudinal Single Cell Atlas Identifies Complex Temporal Relationship between Type I Interferon Response and COVID-19 Severity. ***Nat Commun***. 2024. 15: 567

Publications in 2023

4. Banerjee U, Chunchanur S, R A, Balaji KN, Singh A, Chakravortty D, Chandra N. Systems-level profiling of early peripheral host-response landscape variations across COVID-19 severity states in an Indian cohort. **Genes Immun**. 2023 Aug;24(4):183-193
5. Shyam M, Bhattacharje G, Daniel C, Kumar A, Yadav P, Mukherjee P, Singh S, Das AK, Narender T, **Singh A**, et al. Rationally Designed Novel Phenyloxazoline Synthase Inhibitors: Chemical Synthesis and Biological Evaluation to Accelerate the Discovery of New Antimycobacterial Antibiotics. ***Molecules*****.** 2023. 28(24): 8115
6. ** Das M, Sreedharan S, Shee S, Malhotra N, Nandy M, Banerjeee U, Kholi S, Rajmani R, Chandra N, Seshasayee AN, Laxman S and **Singh A**. Cysteine desulfurase (IscS)–mediated fine- tuning of bioenergetics and SUF expression prevents *Mycobacterium tuberculosis* hypervirulence. ***Sci Adv***. 2023. 15(50): eadh2858.
7. Singh PR, Dadireddy V, Udupa S, Kalladi SM, Shee S, Khosla S, Rajmani RS, **Singh A**, Ramakumar S, Nagaraja V. The *Mycobacterium tuberculosis* methyltransferase Rv2067c manipulates host epigenetic programming to promote its own survival. ***Nat Commun.*** 2023. 14(1): 8497.
8. Banerjee U, Chedere A, Padaki R, Mohan A, Sambaturu N, **Singh A** and Chandra N. PathTracer Comprehensively Identifies Hypoxia-Induced Dormancy Adaptations in *Mycobacterium tuberculosis.* ***J Chem Inf Model***. 2023. 63(19): 6156-6167
9. ** Shee S, Veetil RT, Mohanraj K, Das M, Malhotra N, Bandopadhyay D, Beig H, Birua S, Niphadkar S, Nagarajan SN, Sinha VK, Thakur C, Rajmani RS, Chandra N, Laxman S, Singh M, Samal A, Seshasayee AN, **Singh A**. Biosensor-integrated transposon mutagenesis reveals *rv0158* as a coordinator of redox homeostasis in *Mycobacterium tuberculosis*. ***eLife***. 2023. 29:12. e80218.
10. Dey A, Anand K, **Singh A**, Prasad R, Barthwal R. *MOSR* and *NDH*A Genes Comprising G-Quadruplex as Promising Therapeutic Targets against *Mycobacterium tuberculosis*: Molecular Recognition by Mitoxantrone Suppresses Replication and Gene Regulation. ***Genes***. 2023. 14: 978
11. ** Subhadra, B., Agrawal, R., Pal, V. K., Chenine, A. L., Mattathil, J. G., **Singh, A**. Significant Broad-Spectrum Antiviral Activity of Bi121 against Different Variants of SARS-CoV-2. ***Viruses***, *15*(6), 2023. 15(6):1299

Publications in 2022

12. ** Shee S, Singh S, Tripathi A, Thakur C, Kumar T A, Das M, Yadav V, Kohli S, Rajmani RS, Chandra N, Chakrapani H, Drlica K, **Singh A**. Moxifloxacin-Mediated Killing of *Mycobacterium tuberculosis* Involves Respiratory Downshift, Reductive Stress, and Accumulation of Reactive Oxygen Species. ***Antimicrob Agents Chemother***. 2022. 20: e0059222.

13. ** Bandyopadhyay P, Pramanick I, Biswas R, Sabarinath PS, Sreedharan S, Singh S, Rajmani R, Laxman S, Dutta S and **Singh A**. S-Adenosylmethionine-responsive cystathionine β-synthase modulates sulfur metabolism and redox balance in *Mycobacterium tuberculosis*. ***Sci Adv***. 2022. 8: eabo0097.
14. ** Tripathi A, Anand K, Das M, O'Niel RA, Sabarinath PS, Thakur C, Reddy RRL, Rajmani R, Chandra N, Laxman S and **Singh A**. *Mycobacterium tuberculosis* requires SufT for Fe-S cluster maturation, metabolism, and survival in vivo. ***PLoS Pathog***. 2022. 18(4): e1010475.
15. ****Singh A**, Zhao and Drlica K. Fluoroquinolone heteroresistance, antimicrobial tolerance, and lethality enhancement. ***Front Cell Infect Microbiol***. 2022. 29: 1165.
16. Raja S, Paul A, Raghavan S, Narayanan S, Shee S, **Singh A**, Varshney U, Gopal B and Vijayan. Structural Variability of *Mycobacterium tuberculosis* SSC and susceptibility to inhibition. ***Current Sci***. 2022. 122: 281.
17. Prathiar S, Agrawal R, Pal VK, **Singh A** and Govindaraju T. Reliable fluorometric detection of SARS-CoV2 by targeting the G-Quadruplex through pH- triggered conformational polymorphism. ***ACS Sens***. 2022. 7: 453 – 459.
18. * Thakur C, Tripathi A, Ravichandran S, Shivananjaiah A, Chakraborty A, Vardappa S, Chikkanvenkatappa N, Nagaraja D, Lakshminarasimhaiah S, **Singh A**, Chandra N. A new blood-based RNA signature (R9), for monitoring effectiveness of tuberculosis treatment in a South Indian longitudinal cohort. ***iScience***. 2022. 103745.
19. Shyam M, Verma H, Bhattacharje G, Mukherjee P, Singh S, Kamilya S, Jalani P, Das S, Dasgupta A, Mondal A, Das AK, **Singh A**, Brucoli F, Bagnéris C, Dickman R, Basavanakatti VN, Naresh Babu P, Sankaran V, Dev A, Sinha BN, Bhakta S, Jayaprakash V. Mycobactin Analogues with Excellent Pharmacokinetic Profile Demonstrate Potent Antitubercular Specific Activity and Exceptional Efflux Pump Inhibition. ***J Med Chem***. 2022. 65: 234-256.
20. Banerjee U, Rao P, Reddy M, Hussain M, Chunchanur S, Ambica R, **Singh A** and Chandra N. A 9-gene biomarker panel identifies bacterial coinfections in culture-negative COVID-19 cases. ***Mol Omics***. 2022. 18: 814 – 820.

Publications in 2021

21. ** Pal VK, Agrawal R, Rakshit S, Shekar P, Murthy DTN, Vyakarnam A and **Singh A**. Hydrogen sulfide blocks HIV rebound by maintaining mitochondrial bioenergetics and redox Homeostasis. ***eLife***. 2021. e68487.
22. 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.
23. 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
24. ** Anand K, Tripathi A, Shukla K, Malhotra N, Jamithireddy AK, Jha RK, Chaudhury SN, Rajmani RS, Ramesh A, Nagaraja V, Gopal B, Nagaraju G, Seshasayee 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.
25. 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.
26. ** Das M, Dewan A, Shee S and **Singh A**. The Multifaceted Bacterial Cysteine Desulfurases: From Metabolism to Pathogenesis. ***Antioxidants***. 2021. 10: 997
27. Banerjee U, Baloni P, **Singh A** and Chandra N. Immune Subtyping in Latent Tuberculosis. ***Front Immunol***. 2021. 12: 595746.
28. 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.
29. ** 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.

Publications in 2020

30. ** Mishra R, Yadav V, Guha M and **Singh A**. Heterogeneous Host–Pathogen Encounters Coordinate Antibiotic Resilience in *Mycobacterium tuberculosis.* ***Trends Microbiol****. 2020. S0946-842.*

31. 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.
32. 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.
33. 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***. 2020. RA120: 012809.
34. ** Tyagi P, Pal VK, 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.

Publications in 2019

35. ** Mishra R, Kohli S, Malhotra N, Bandyopadhyay 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.
36. ** 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.
37. 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.

Publications in 2018

38. ** 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.
39. 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.
40. ***Singh A** and Surolia A. Tuberculosis: Today's researches-tomorrow's therapies. ***IUBMB Life***. 2018. 70(9): 814-817.
41. * 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.
42. ** 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.
43. 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.
44. ** Pal VK, Bandyopadhyay P and **Singh A**. Hydrogen sulfide in physiology and pathogenesis of bacteria and viruses. ***IUBMB Life***. 2018. 70 (5): 393-410.

Publications in 2017

45. ** 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.
46. 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.
47. * 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.

48. 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.

Publications in 2016

49. * 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.
50. 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.
51. 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.
52. 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.
53. ** 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.
54. 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.

Publications in 2015

55. 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.
56. 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.
57. 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.
58. * 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.
59. 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.
60. ** 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.

Publications in 2014 - 2011

61. **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.

62. ** 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.
63. 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.

Publications as a Post-Doctoral Fellow

64. 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.
65. **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.
66. **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.
67. **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.

Publications as a Doctoral Fellow

68. Singh R, **Singh A** and Tyagi AK. Deciphering the genes involved in pathogenesis of *Mycobacterium tuberculosis*. ***Tuberculosis*** (Edinb). 2005. 85(5-6): 325-35.
69. **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.
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71. 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. Disruption of mptpB impairs the ability of *Mycobacterium tuberculosis* to survive in guinea pigs. ***Mol Microbiol***. 2003. 50(3): 751-62. XS
72. **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.

D. Research

<u>Ongoing Research Projects</u>

1. Riboswitch-controlled glycine metabolism in pathogenic mycobacteria, MRC-UKRI, 2023 – 2026
2. Accelerated Clearance of SARS-CoV-2 using Hydrogen Sulfide gas, STARS-IISc, 2023 – 2026
3. Modulating host metabolism and bioenergetics to accelerate killing of *Mycobacterium tuberculosis*, DBT, 2023 – 2026
4. Understanding Redox Network of *Mycobacterium tuberculosis* to Potentiate the Efficacy of Anti-TB drugs, DST-SERB, 2023 – 2026
5. Targeting Non-replicating Drug Tolerant *M. tuberculosis* through a Pro-drug Strategy, Ignite Life Science Foundation, 2023 – 2026
6. Gas mediated silencing of Human Immunodeficiency Virus, DST-SERB, 2022 – 2025
7. The role of anaplerotic node in redox homeostasis of *Mycobacterium tuberculosis* and its exploitation as a therapeutic target, BBSRC-UK, 2020 – 2024

8. Genome Sequencing and Study of Vaccine Response against SARS Cov-2 mutants, CryptoRelief fund, 2021 – 2023
9. Mechanisms of stress tolerance in *Mycobacterium tuberculosis* and its physiological relevance, DBT, 2017 – 2023

Completed Research pPojects

1. Towards Elimination of Mycobacterial Persisters through a Prodrug Approach, DBT, 2023 (3 Months)
2. Fe-S cluster biogenesis and regulation in *Mtb,* Wellcome Trust India Alliance,2017 – 2023
3. Investigating Mycobacterial Responses to Endogenous Peroxynitrite (Co-PI), DBT, 2018 – 2022
4. Shortening tuberculosis therapy duration using chloroquine, DBT, 2021 - 2022
5. Gas-mediated antibiotic resistance in *Mycobacterium tuberculosis*, DBT, 2019 – 2022
6. Understanding HIV-I Persistence and Reactivating through Nature-Inspired Redox-Nanozyme, DBT, 2019 – 2021
7. Role of WhiB3 and WhiB7 in resistance to acidic pH, DBT, 2015-2018
8. Understanding the mechanisms of drug resistance mechanisms in *Mycobacterium tuberculosis*, DBT 2015-2018
9. Control of *Mycobacterium tuberculosis* dormancy and reactivation program by the oxygen sensor WhiB4, Wellcome Trust India Alliance, 2010-2015
10. Measuring intracellular redox potential of *Mycobacterium tuberculosis* using redox sensitive GFP, DBT, 2014-2016
11. Role of oxidoreductive stress in HIV-TB co-infection,NIH- ICMR, 2014-2017
12. Measuring glutathione redox potential of HIV-1 infected macrophages, NIH, USA, 2010-2013