Left to right: Dr.Shaikh Abdul Mubeen, Deepak Vats, Diravyaseelan M, Hema Yadav,**Dr. Archana Singh**, Dr. Sudhasini Panda, Alisha Arora, Faisal Shah

Tuberculosis Immunology and Clinical Chemistry Laboratory Name of Faculty

Member: Dr. Archana Singh

Designation: Additional Professor

Address: Room no. 3022, Dept. of Biochemistry, III floor, Teaching Block, AIIMS, Ansari Nagar, Delhi

Official Phone: 011-26593467

Email id: archanasinghmamc@gmail.com, archanasinghaiims@gmail.com

Academic Details

Degree	Subject	University/ Institution	Year
M.B.B.S.	Bachelor of Medicine and Surgery	Maulana Azad Medical College, Delhi University	1998-2003
M.D.	Biochemistry	Lady Hardinge Medical College, Delhi University	2005-2008

Positions held:

Position	Department	University/ Institution	Dates

Senior Resident	Biochemistry	Lady Hardinge Medical College	27 May 2008 - 30 Dec 2009
Assistant Professor	Biochemistry	University College of Medical Sciences	31 Dec 2009 - 13 June 2014
Assistant Professor	Biochemistry	All India Institute of Medical Sciences	14 June 2014 – 30th June 2017
Associate Professor	Biochemistry	All India Institute of Medical Sciences	1st July 2017 – 30th June 2020
Additional Professor Professor	Biochemistry Biochemistry	All India Institute of Medical Sciences All India Institute of Medical Sciences	1st July 2020- 30th June 2024 1st July 2024- till date

Notable Awards and Society Memberships

- Life member of the Association of the Medical Biochemist of India (AMBI), Association of the Clinical Biochemists of India (ACBI), Indian Society for Atherosclerosis Research (ISAR), Indian Immunology Society
- **Executive Member** of Indian Immunology society National body (2016-2022)
- **Joint Secretary** of Indian Immunology Society National body (2022- 2024)
- Trained on **medical laboratories quality management system and Internal audit as per IS/ISO 15189** from National Institute of training for standardization, Bureau of Indian Standards, Noida, Delhi.
- Worked on various aspects of complicated pregnancy (Pre-eclampsia and IUGR) and has won three awards namely **Dr. C Sita Devi Award** for best paper twice at Association of Clinical biochemists of India in 2010 and 2013 and **International Federation of Clinical Chemistry Roche Travel Scholarship** to attend and present poster at Asian Pacific Federation of Clinical Biochemistry 2013, Bali, Indonesia.
- At present working in tuberculosis has got few awards won by Sudhasini Panda (PhD student) and Dr Ambrish Tiwari (MD student) which are as follows: **Travel award** to present paper at APFCB 2016, **best paper** at ACBI Delhi chapter 2016 and **Dr P Usha Sharma best paper** at ACBICON 2017. Won third price for AIIMS excellence Research Award 2019

Research Focus of the Lab (upto 1000 words)

In the past, she was working on various aspects of women health, to understand mainly genetic and Immunological aspect of pre-eclampsia and intra uterine growth restriction, also involving development of new treatment modalities with respect to nitric oxide. She and her team have published about seven original studies so far on this aspect. Her work on various aspect of complicated pregnancy has won three awards as mentioned above.

Presently, she is interested in exploring the biochemical, genetic and immunological host factors of tuberculosis in understanding disease pathophysiology and development of diagnostic biomarkers for identification of latent TB among household contacts. For the last

seven years, her lab has been actively working on understanding the host factors like vitamin D, nitric oxide and iron regulatory proteins that could influence the pathophysiology of pulmonary tuberculosis (TB) with respect to the latency of infection by studying closed household contacts of TB patients. They have already finished one SERB funded project "Study of vitamin D receptor (VDR) and cathelicidin expression and their correlation with Fok1 VDR polymorphism in Tuberculosis" and established a cohort of 200 pulmonary TB patients and their household contacts studying these host factors which was published as three independent research articles (Scientific Reports 2019, J Steroid Biochem Mol Biol 2019 and Ind J Clin Biochem 2021).

Her lab is also working on the adaptive immune responses and the genetic correlates in the household contacts of active pulmonary TB patients. It would be interesting to understand why some of the household contacts do not develop tuberculosis and what are the immunological basis for the same. Thus, the findings will add bulk to the global scientific library of tuberculosis regarding the same.

In addition to above, she is interested in understanding why diabetic individuals are more prone to develop tuberculosis. They are studying the role of macrophage effector function in hyperglycemia to understand the same. The article regarding this work has got recently accepted for publication in the European Journal of Immunology.

Her lab is also working in tandem to explore the various adjunct therapies for tuberculosis treatment.

Research Projects:

Tuberculosis

- Study of immune response in TST (Tuberculin Skin Test) and IGRA (Interferon Gamma Release Assay) negative household contacts compared to latent TB infected household contacts of adult pulmonary tuberculosis patients **(Science and Engineering Research Board- 2022-2025, ongoing) (PI, PhD thesis)**
- Study of Immunophenotypes of monocyte subsets in TST and IGRA negative household contacts of adult pulmonary Tuberculosis **(ICMR Financial support for MD thesis-2021, ongoing) (M.D. thesis Supervisor)**
- Study of effect of hyperglycemia on phenotypic and functional alteration in differentiated macrophages from THP1 cell line and monocytes from pulmonary tuberculosis patients **(ICMR-2019 to 2022, ongoing) (PI, PhD thesis)**
- Study of Mycobacterium indicus pranii and human beta defensin 2 as adjunct and chemoimmunotherapy against Mycobacterium tuberculosis *in vitro* **(IMRG-2019-2021, completed) (PI, M.Sc. thesis)**
- Study of hyperglycemia on macrophage effector function in pathophysiology of pulmonary tuberculosis **(Science and Engineering Research Board-2018-2021, completed) (PI, PhD thesis)**
- To study the expression of nitric oxide and inducible nitric oxide synthase (iNOS) and their correlation with iNOS gene polymorphic variants in tuberculosis patients and controls **(ICMR PG thesis grant, completed) (M.D. thesis Supervisor)**
- Study of vitamin D receptor (VDR) and Cathelicidin expression and their correlation with Fok I polymorphism in tuberculosis **(PI, Science and engineering Research board**, **DST YSS extramural grant-2015-2018, completed) (PI, M.Sc thesis)**

- Serum hepcidin levels: Correlation with ferroportin expression and localization and thus iron export in pathophysiology of pulmonary tuberculosis **(IMRG-2017-2018, completed) (PI, M.Sc. thesis)**
- Expression of Vitamin D Binding Protein (VDBP) and plasma concentration of Vitamin D in pulmonary tuberculosis **(STS ICMR-2016, completed) (Supervisor STS)**
- **TB association of India** (short grant, received twice)

Others

She is also involved as co-Investigator and Co-guide in other interdepartmental Extramural and Intramural projects and DM/Mch/PhD/MD/MS/MSc/MBBS thesis and research work.

List of Lab members (Including technicians and attendants)

1. Mr. Deepak Vats (PhD student)
2. Ms. Geeta Rani
3. Mr. Dhiraj Kumar (MSc student)
4. Dr. Payal Kumari Goyal (Junior Resident)
5. Mrs. Purnima Gola (Senior Laboratory Technologist)
6. Karan (Lab Assistant) Lab Alumni

1. Ms. Alisha Arora (PhD student)

2. Ms. Vidushi Sharma (MSc student)

3. Dr. Shaikh Abdul Mubeen (Junior Resident)

4. Ambrish Tiwari (MD)
5. Dr. Sudhasini Panda (PhD and MSc)

Current Affiliation: Postdoctoral fellow, La Jolla Institute for Immunology, San Diego, California

6. Dr. Diravyaseelan M (M.D)

Current Affiliation:

7. Mr. Faisal Shah (MSc)

Current Affiliation: PhD Scholar, Friedrich-Loeffler-Institute, University of Griefswald, Griefswald, Germany

8. Ms. Hema Yadav (MSc)

Current Affiliation: PhD Scholar, Department of Biochemistry, AIIMS, Delhi

Positions Available

Interested in taking JRF/research trainees/ MBBS summer fellows as and when funds are available

Key publications

*** Communicating Author**

1. **Archana Singh*,** Deepika Sharma, Chitra Raghunandan, Jayashree Bhattacharjee. "Role of inflammatory cytokines and eNOS gene Polymorphism in pathophysiology of pre-eclampsia" . American Journal of Reproductive Immunology 2010 ; 63 (3):244-25
2. Deepika Sharma, **Archana Singh**, Shubha S. Trivedi, Jayashree Bhattacharjee **"** Role of Endothelin and Inflammatory Cytokines in Pre-eclampsia – A Pilot North Indian Study " .American Journal of Reproductive Immunology 2010 ; 65(4):428-32.
3. Tanuj Chawla, Deepika Sharma, **Archana Singh*** "Role of the renin angiotensin system in diabetic nephropathy". World J Diabetes. 2010 ; 1(5): 141-145.
4. Deepika Sharma, Parul Goyal, **Archana Singh**, Shubha S. Trivedi, Jayashree Bhattacharjee. "Intergenotypic variation of oxidative stress marker of eNOS (Glu298Asp) gene polymorphism in preeclampsia". Anatolian Journal of Obstetrics & Gynecology 2010 ; 3:2 : ISSN 1308-8254
5. Deepika Sharma, **Archana Singh**, Shubha S. Trivedi, Jayashree Bhattacharjee. Intergenotypic Variation of Nitric Oxide and Inflammatory Markers in Preeclampsia in North Indian Population. Human Immunology 2011 ;72 (5): 436-439 Deepika Sharma, S. A. Hussain, N Akhter, **Archana Singh**, Shubha S. Trivedi, Jayashree Bhattacharjee. Endothelial nitric oxide synthase (eNOS) gene Glu298Asp polymorphism and expression in North Indian preeclamptic women. Pregnancy Hypertension: An International Journal of Women's Cardiovascular Health 2013; 4(1): 65-69
6. Siddhamsetty AK, Verma SK, Kohli A, Verma A, Puri D, **Singh A**. Exploring time of death from potassium, sodium, chloride, glucose & calcium analysis of postmortem synovial fluid in semi-arid climate. Journal of forensic legal medicine. Nov 2014; 28: 11-4.
7. **Archana Singh***, Chitra Raghunandan and Jayashree Bhattacharjee. Endothelin: link between the primary placental causes and the secondary systemic endothelial dysfunction in pathophysiology of pre-eclampsia.Obstetrics and Gynecology International Journal. June 2015; 2(3): online
8. Shalini Singh, **Archana Singh***, Deepika Sharma, Abha Singh, M. K. Narula and Jayashree Bhattacharjee. Effect of L-Arginine on Nitric Oxide Levels in Intrauterine Growth Restriction and its Correlation with Fetal Outcome. Indian Journal of Clinical Biochemistry. July 2015; 30(3): 298-304.
9. Ashok Kumar Ahirwar, Anju Jain, **Archana Singh**, Binita Goswami, M K Bhatnagar and Jayashree Bhattacharjee. The study of markers of endothelial dysfunction in metabolic syndrome. Horm mol Biol Clin Invest Dec 2015; 24(3):131-6.
10. Ahirwar AK, **Singh A**, Jain A, Patra SK, Goswami B, Bhatnagar MK, Bhatacharjee J. Raised TSH is associated with endothelial dysfunction in Metabolic Syndrome: A case control study. Romanian Journal of Internal Medicine. June 2017, 55(4):212-221
11. AK Ahirwar, **A Singh**, A Jain, SK Patra, B Goswami, MK Bhatnagar and J Bhattacharjee. Role of Sub Clinical Hypothyroidism in Association with Adiponectin Levels Causing Insulin Resistance in Metabolic Syndrome: A Case Control Study. The Tokai journal of experimental and clinical medicine. July 2017; 42 (2): 96-103.

12. Ahirwar AK, **Singh A**, Jain A, Kaim K, Bhardwaj S, Patra SK, Goswami B, Bhatnagar MK, Bhattacharjee J. Association of prothrombotic adipokine (plasminogen activator inhibitor-1) with TSH in metabolic syndrome: a case control study. Horm Mol Biol Clin Investig. 2017 Dec 20;34(1).
13. Sudhasini Panda, Ambrish Tiwari, Kalpana Luthra, S. K. Sharma & **Archana Singh*** Association of Fok1 VDR polymorphism with Vitamin D and its associated molecules in pulmonary tuberculosis patients and their household contacts. *Sci Rep* **9,** 15251 (2019)
14. Sudhasini Panda, Ambrish Tiwari, Kalpana Luthra, S. K. Sharma & **Archana Singh*** Status of vitamin D and the associated host factors in pulmonary tuberculosis patients and their household contacts: A cross sectional study. The Journal of Steroid Biochemistry and Molecular Biology [27 Jun 2019, 193:105419]
15. Abhishek Gupta, Veereshwar Bhatnagar, Anjan Kumar Dhua, Manisha Jana, **Archana Singh**, Rohan Malik. Correlation of Hepatic Artery Resistive Index with Portal Pressure and Serum Nitric Oxide Levels in Patients with Extrahepatic Portal Vein Obstruction. J Indian Assoc Pediatr Surg. 2020 Jan-Feb; 25(1): 38–42. PMC6910058
16. Shashi Kant, Ravneet Kaur, Farhad Ahamed, **Archana Singh**, Sumit Malhotra, Rakesh Kumar. Effectiveness of intravenous ferric carboxymaltose in improving hemoglobin level among postpartum women with moderate-to-severe anemia at a secondary care hospital in Faridabad, Haryana – An interventional study. Indian Journal of public health. 2020; 64 (2):168-172
17. **Archana Singh***, Sudhasini Panda, Diravyaseelan M, et al. Role of hyperglycemia on macrophage effector function in pathophysiology of pulmonary tuberculosis. BMC Infectious Diseases, May 20, 2020, 20(suppl 1):324
18. **Archana Singh***, Sudhasini Panda, Ambrish Tiwari, Kalpana Luthra, S K Sharma. Vitamin D modulates innate immunity in pulmonary tuberculosis. The Journal of Immunology, May 1,2020,204 (1 supplement) 227.3
19. Sudhasini Panda, Shah Faisal, Krishna Kumar, Diravya M. Seelan, Alpana Sharma, Neeraj Kumar Gupta, Sudip Datta & **Archana Singh*.** Role of Regulatory Proteins Involved in Iron Homeostasis in Pulmonary Tuberculosis Patients and Their Household Contacts. Ind J Clin Biochem , 6 Jan 2021. https://doi.org/10.1007/s12291-020-00947-w
20. Yadav H, Irugu D, Ramakrishanan L, **Singh A**, Abraham R, Sikka K, Thakar A, Verma H. An evaluation of serum Otolin-1 & Vitamin-D in benign paroxysmal positional vertigo. Journal of Vestibular Research: Equilibrium & Orientation, 06 Mar 2021,DOI: 10.3233/ves-201601 PMID: 33720865
21. Ravneet Kaur, Shashi Kant, Partha Haldar, Farhad Ahamed, **Archana Singh,** Vignesh Dwarakanathan, Sumit Malhotra, Kapil Yadav .Single dose of IV Ferric Carboxy Maltose (FCM) prevents anemia for six months among moderately or severely anemic postpartum women: a case study from India" has been accepted for publication in Current Developments in Nutrition(CDN). Accepted May 2021
22. Sudhasini Panda, Diravya M Seelan, Shah Faisal, Alisha Arora, Kalpana Luthra, Jayanth Kumar Palanichamy, Anant Mohan, Naval K Vikram, Neeraj Kumar

Gupta, Lakshmy Ramakrishnan, **Archana Singh***. Chronic hyperglycemia drives alterations in macrophage effector function in pulmonary tuberculosis. European Journal of Immunology (under publication-Accepted)

Patient Care: Presently In - charge of clinical chemistry laboratory, Department of Biochemistry, All India Institute of Medical Sciences, Delhi. Is also in charge for **porphyria testing** in the department.

Students presently working in Laboratory

1. **Mr. Deepak Vats (PhD student)**

Deepak completed his B.Sc. (H) in Zoology from Panjab University in 2017. He did his M.Sc. in Zoology from CCS Haryana Agricultural University in 2019. He qualified CSIR- NET-JRF in December 2020. Currently he is a second year PhD student under the guidance of Dr. Archana Singh. His PhD thesis is on "Study of immune response in TST (Tuberculin Skin Test) and IGRA (Interferon Gamma Release Assay) negative household contacts compared to latent TB infected household contacts of adult pulmonary tuberculosis patients."