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Education

2010 **Ph. D.** Indian Institute of Science, Bangalore, India.

(**Thesis title:** *Structural studies of mycobacterial uracil-DNA glycosylase (Ung) and single-stranded DNA binding protein (SSB).*

Supervisor: Professor M. Vijayan)

2003 **M. Sc.** University of Jammu, Jammu, India.

2001 **B. Sc.** Himachal Pradesh University, Shimla, India.

Research Experience

Jan 2024 –	Associate Professor Regional Centre for Biotechnology, Faridabad.
Oct 2018 – Dec 2023	Assistant Professor Regional Centre for Biotechnology, Faridabad.
May 2017 – Oct 2018	Staff Scientist IV Centre for DNA Fingerprinting and Diagnostics, Hyderabad.
Oct 2012 – May 2017	Research Affiliate Wadsworth Center, Albany, NY, USA.
Mar 2011 – Sep 2012	Postdoctoral Fellow Case Western Reserve University, Cleveland, OH, USA.
Aug 2010 – Feb 2011	Research Associate Indian Institute of Science, Bangalore, India.
Aug 2003 – Aug 2010	Ph.D. Research Fellow Indian Institute of Science, Bangalore, India.

Research Interests

Protein synthesis, translation regulation, Cryo- electron microscopy, single particle reconstruction, and structure-based drug design.

Professional Qualifications and Awards

1. **EMSI Excellence in Microscopy Award 2023**
2. **EMBL travel grant, 2023** (to attend EMBL conference on Protein synthesis and translation regulation at Heidelberg, Germany)

3. DST-SERB **Early Career Research Award**, (2019).
4. Qualified in National Eligibility Test (NET/JRF) (2003) conducted by CSIR (Council of Scientific & Industrial Research) for '**Doctoral research fellowship**'.
5. Qualified in Graduate **Aptitude Test in Engineering (GATE)** (2003) conducted by Department of education, MHRD, Government of India.
6. Qualified in Combined Biotechnology Entrance Examination (2001), conducted by JNU, New Delhi, India, for **admission into M.Sc Biotechnology**.
7. **Republic Day (1996) Prashasti Patar (Citation)** for achievements in the field of Science.
8. **Outstanding team effort prize winner** for making reflective type telescope at CSIO, Chandigarh, 1995.
9. Our model on "water purification by solar energy" was displayed in **National Science Exhibition 1995** at Pragati Maidan, New Delhi, and published by **NCERT in 1995**.

Memberships of Societies

1. Life Member, Indian Crystallography Association (ICA)
2. Life Member, Electron Microscopy Society of India (EMSI)

Publication

1. Kumar N, Sharma S, **Kaushal PS**[#] (2024). Cryo- EM structure of the mycobacterial 70S ribosome in complex with ribosome hibernation promotion factor RafH. **Nature Communication**. 15(1):638. **BioRxiv** <https://doi.org/10.1101/2023.04.18.537051>.
2. Prajapat SK, Mishra L, Khera S, Owusu SD, Ahuja K, Sharma P, Choudhary E, Chhabra S, Kumar N, Singh R, **Kaushal PS**, Mahajan D, Banerjee A, Motiani RK, Vrati S, Kalia K (2024). Methotrimoprazine exerts antiviral and neuroprotective effects in Japanese encephalitis virus infection through activation of adaptive ER stress and autophagy. **EMBO Molecular Medicine**. 1:185-217..
3. Arora A, **Kaushal PS**[#]. (2023). Cryo-EM in the study of ribosome biogenesis. **CRC Press Taylor & Francis Group**. Accepted. (Book chapter).
4. Pal P, Khan MY, Sharma S, Kumar Y, Mangla N, **Kaushal PS**, Agarwal N. (2023). ResR/McdR-regulated protein translation machinery contributes to drug resilience in *Mycobacterium tuberculosis*. **Commun Biol**. 6:708.
5. Agarwal N, Sharma S, Pal P, **Kaushal PS**, Kumar N. (2022) Era, a GTPase-like protein of the Ras family, does not control ribosome assembly in *Mycobacterium tuberculosis*. **Microbiology** (Reading). doi: 10.1099/mic.0.001200.
6. Kumar N, Sharma S, **Kaushal PS**[#]. (2021) Protein synthesis in *Mycobacterium tuberculosis* as a potential target for therapeutic interventions. **Mol Aspects Med**. doi: 10.1016/j.mam.2021.101002.
7. Koripella RK, Sharma MR, Bhargava K, Datta PP, **Kaushal PS**, Keshavan P, Spremulli LL, Banavali NK & Agrawal RK. (2020) Structures of the human mitochondrial ribosome bound to EF-G1 reveal distinct features of mitochondrial translation elongation. **Nature Communication** **11**, 3830.
8. Li Y, Sharma MR, Koripella RK, Yong Y, **Kaushal PS**, Lin Q, Wade JT, Gray TA, Derbyshire KM, Agrawal RK, & Ojha AK. (2018) Zinc depletion induces ribosome hibernation in mycobacteria. **Proceedings of the National Academy of Sciences USA (PNAS)** **115**:8191-6.

9. Qu G^{*}, **Kaushal PS^{*}**, Wang J^{*}, Shigematsu H, Piazza CL, Agrawal RK, Belfort M & Wang HW. Structure of group II intron complexed with its transcriptase. (2016) **Nature Structure and Molecular Biology (NSMB)** **23**, 549-57. (*equal contributions). Highlighted as *the News and Views in NSMB* **23**, 507-9.
10. **Kaushal PS**, Sharma MR and Agrawal RK. (2015) The 55S mammalian mitochondrial ribosome and its tRNA-exit region. **Biochimie**. 114, 119-26. [Review]
11. **Kaushal PS^{*}**, Sharma MR^{*}, Booth TM, Haque E, Tung C, Sanbonmatsu KY, Spremulli LL and Agrawal R K. (2014) Cryo-EM structure of the small subunit of the mammalian mitochondrial ribosome. **Proceedings of the National Academy of Sciences USA (PNAS)** 111(20), 7284-9 (*equal contributions).
12. Sharma MR, **Kaushal PS**, Gupta M, Banavali N K, & Agrawal RK. (2013) Insights into structural basis of mammalian mitochondrial translation. In **Translation in Mitochondria and Other Organelles**, Duchene, A.M. ed. (Springer-Verlag, Berlin/Heidelberg), pp. 1-28, DOI: 10.1007/978-3-642-39426-3_1. (book chapter)
13. Ahmad MF, **Kaushal PS**, Wan, Q, Wijeratna SR, An X, Huang M & Dealwis CD. (2012) Role of arginine-293 and glutamine-288 in communication between catalytic and allosteric sites in yeast ribonucleotide reductase. **Journal of Molecular Biology** 419, 315-29.
14. **Kaushal PS**, Wan Q, Faber C, & Dealwis C. (2012) Crystal dehydration Technique. In **Crystallography: Research, Technology and Applications**, Hokkaido, M. and Nagano, E. ed. (Nova Science Publishers, Inc.), pp. 91-104, ISBN:978-1-62081-574-8. (book chapter).
15. Wijerathna SR, Ahmad MF, Xu H, Fairman JW, Zhang A, **Kaushal PS**, Wan Q, Kiser J & Dealwis CG. (2011) Targeting the Large Subunit of Human Ribonucleotide Reductase for Cancer Chemotherapy. **Pharmaceuticals**, 4(10),1328-54. (Review)
16. **Kaushal PS**, Singh P, Sharma A, Muniyappa K & Vijayan M. (2010) X-ray and molecular dynamics studies on *Mycobacterium leprae* single-stranded DNA binding protein and comparison with other eubacterial SSB structures. **Acta Crystallographica D66**, 1048-58.
17. **Kaushal PS**, Talawar RK, Varshney U & Vijayan M. (2010) Structure of uracil-DNA glycosylase from *Mycobacterium tuberculosis*. Insights into interactions with ligands. **Acta Crystallographica F66**, 887-92 (cover illustration).
18. **Kaushal PS**, Talawar RK, Krishna PD, Varshney U & Vijayan M. (2008). Unique features of the structure and interactions of mycobacterial uracil-DNA glycosylase: structure of a complex of the *Mycobacterium tuberculosis* enzyme in comparison with those from other sources. **Acta Crystallographica D64**, 551-560.
19. **Kaushal PS**, Sankaranarayanan R & Vijayan M. (2008) Water-mediated variability in the structure of relaxed-state haemoglobin. **Acta Crystallographica F64**, 463-9.
20. **Singh P**, Talawar RK, Krishna PD, Varshney U & Vijayan M. (2006) Overexpression, purification, crystallization and preliminary X-ray analysis of uracil N-glycosylase from *Mycobacterium tuberculosis* in complex with a proteinaceous inhibitor. **Acta Crystallographica F62**, 1231-4.

corresponding author, * equal contribution

Invited talk delivered

1. Title “The unique mode of mycobacterial ribosome hibernation revealed by Cryo- EM studies” at National Seminar on Crystallography organized by **IMTECH Chandigarh** on November 22-24, 2023.

2. Title "*Basic in the cryo- EM data processing*" at one-day introductory seminar series (online mode) on Cryo- Electron Microscopy for Structural Biology organized by **NIT Warangal** and **SASTRA University Thanjavur** on November 18, 2023. (<https://youtu.be/BnS-wSmDzH0>).
3. Title "*Cryo- electron microscopy (cryo- EM): the modern technique for the structure determination of biomolecules in atomic resolution*" at Prof. M. Vijayan Menon's Annual Symposium organized by **SASTRA University Thanjavur** on October 8 -9, 2023.
4. Title "Unique mode of mycobacterial ribosome hibernation revealed through cryo- EM" at a workshop on Optimizing CryoEM for Research: Strategies for Effective Utilization of the Facility organized by SATHI Foundation, **IIT Delhi** on August 2, 2023.
5. Title "*The unique strategy of mycobacterial ribosome hibernation revealed by cryo- EM*" at 1st symposium on Cryo- Electron Microscopy of Biological Systems (CEMBioS Symposium), **NISER, Bhubaneswar**, on February 13–14, 2023.
6. Title "*Cryo- electron microscopy (cryo- EM): a modern technique for the structure visualization of biomolecules in the atomic details*" at the international conference on Exploring New Horizons in Biotechnology, NEB, 2023, **Banaras Hindu University** on February 10–12, 2023.
7. Title "*Dealing structural heterogeneity in cryo- EM data*" at the CEM3DIP meeting, **IISER Pune** on December 17, 2022.
8. Title "*Cryo- EM structure of the mycobacterial ribosome in complex with ribosome hibernation factor, RafH*" at the 49th National Seminar on Crystallography, **University of Jammu**, Jammu, on November 28-30, 2022.
9. Title "*Recent advances in single-particle cryo-electron microscopy (cryo-EM) to determine the structure of biological macromolecules*" at "International Seminar on Recent Trends in Omics, Regenerative and Precision Medicine", **University of Kerala** on July 22-24, 2022. (Virtual mode).
10. Title "*Recent advances in single-particle cryo-electron microscopy (cryo-EM) to determine the structure of biological macromolecules*" at Virtual Workshop on Basic of Electron Microscopy on October 20, 2021, by **ATPC, RCB Faridabad**. (virtual mode).
11. Title "*Recent advances in single particle cryo- electron microscopy (cryo-EM) to determine the structure of biological macromolecules*" at Virtual Workshop on Basic of Electron Microscopy organized on March 3, 2021, by **ATPC, RCB Faridabad** (virtual mode).
12. Title "*The Cryo- EM structure of group II intron*" at the '12th Asia Pacific Microscopy Conference, **HICC Hyderabad**' from February 3 -7, 2020.
13. Title "*Cryo-electron microscopy (cryo-EM) the fast emerging technique in modern biology*" at the **University of Jammu** on May 13, 2019.
14. Title "*Cryo-electron microscopy studies of the ribonucleoprotein complexes: group II intron and ribosomes*" at **IIT Roorkee**, on April 19, 2019.
15. Title "*The cryo- electron microscopy (cryo-EM) structure of the group II intron*" at the 'EMSI International Conference XXXVII Annual Meeting' **Mayfair Convention Centre, Bhubaneswar** on July 16-17 July 2018.
16. Title "Cryo- electron microscopy studies of mycobacterial ribosome" at Opening symposium and inauguration of National Cryo- EM facility, **NCBS Bangalore** on January 24-25, 2018.
17. Title "Novel Prize in Chemistry 2017" at **Sir P. T. Sarvajanik college of science, Athwalines, Surat** on February 16, 2018.

18. Title "*Methods in single particle 3D orientation determination*" at EMBO practical course, CEM3DIP 2018: of macromolecular assemblies and cellular tomography, IIT Delhi on March 18-29, 2018.

Science Outreach

1. Delivered a talk titled "**Career Prospects in Biotechnology Research**" at Manav Rachna International Institute of Research and Studies, Faridabad, on 17th August 2023.
2. Science outreach activity, visited Govt Primary School, Barshanghar of Distt Kullu, HP and Govt Centre Primary School, Shanghar, Distt Kullu HP. Delivered talks titled "**The Importance of Education**" on June 1-3, 2022.
3. Delivered talk "**Career options in Science**" on International Women's Day on March 8, 2022, organized by Regional Centre for Biotechnology, Faridabad.
4. Showcased the **structural biology research activity at RCB**, Faridabad, through a virtual mode, in Vigyan Pradarshini, organized to commemorate India's 75th year of independence on December 10, 2021.
5. Delivered a webinar on "**Life and work of the great Indian scientist Professor G.N. Ramachandran**" on July 23, 2021, organized by RCB, Faridabad, as a part of Science Setu to commemorate the 75th Year of Indian Independence. Here is the weblink: https://www.youtube.com/watch?v=uJQGXi_HIMk
6. Mentored the students to showcase the "**Life and work of the great Indian scientist Dr. K.S. Krishnan**" showcased on July 10, 2021, organized by RCB, Faridabad, as a part of Science Setu to commemorate the 75th Year of Indian Independence. Here is the weblink: <https://www.youtube.com/watch?v=ncCn8Qlmi1w>
7. Delivered a webinar on "**Opportunities & fellowships in India to pursue research as a career option**" organized by the Department of Higher Education, Kullu, HP, on September 27, 2020. Here is a weblink https://www.youtube.com/watch?v=llkaCoz5dnQ&feature=share&fbclid=IwAR2IN4tBo4qavypVERQI0f2Fgqz-WpLYEh11PyRIUP_KuORxH8Yh9A5Bxao
8. Showcased the research activity of **structural biology at RCB, Faridabad**, through a virtual mode, in Vigyan Yatra as a part of the 6th India International Science Festival 2020 (IISF 2020) on December 21, 2020.
9. I was invited to NEWS PLUS TV studio on July 29, 2020, and provided information on **various fellowships available to pursue research a career option**. Here is the link https://www.youtube.com/watch?v=aGd1ojLQOO0&feature=share&fbclid=IwAR0T_cgVQ-ip_-NxvTFoDXxKhTZU28lc4cfpiChGlrxlyJFWway2-GYXXiQ.

Conference/Workshop/Symposium/ organized.

1. Co-organized, the virtual workshop titled "**Computational Structure-based Screening and Explicit Molecular Dynamics**" Oct. 5-6, 2021.
2. Co-organized, the virtual Workshop on "**Basic of Electron Microscopy**" Oct. 20, 2021, at ATPC, RCB Faridabad.
3. Primary organizer for an international conference titled "**Structure Assisted Development of Novel Therapeutics**" at the Regional Centre for Biotechnology, Faridabad, Feb. 13-16

2019.

Selected Conference/Workshop/Symposium/presentation.

1. Presented poster at the **EMBL conference on Protein Synthesis and Translation Regulation, Heidelberg, Germany**, on September 6-10, 2023.
2. Attended the **XXIV Congress and general assembly of the International Union of Crystallography (IUCr)** at the International Convention Centre, Hyderabad, India on August 21-28, 2017.
3. Presented poster at the **International Symposium on Cryo-EM 3D Image Analysis 2014, Lake Tahoe, CA USA**, on March 30 – April 4, 2014.
4. Presented poster at the **XXI Congress and general assembly of the International Union of Crystallography (IUCr). Osaka, Japan**, on August 23 -28, 2008.
5. Oral presentation at the **National Symposium on Biophysics 'Biophysics in Medicine and Biology, Chandigarh, India**, on November 15 – 17, 2007.
6. Presented poster at the **11th ADNAT Convention on Advances in Structural Biology and Structure Prediction. Hyderabad, India**, on February 23 -25, 2007.