

## Prem S. Kaushal, Ph. D.

Associate Professor, Regional Centre for Biotechnology,  
NCR Biotech Science Cluster, Faridabad - 121001 INDIA

E. mail: [prem.kaushal@rcb.res.in](mailto:prem.kaushal@rcb.res.in), [itspkaushal@gmail.com](mailto:itspkaushal@gmail.com)

Web page: <https://www.rcb.res.in/index.php?param=empdetails/prem>  
<http://the-kaushal-lab.co.in>

ORCID ID: 0000-0001-6433-1368

Phone +91-9958755338

### 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 – Apr 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 Corporate Partnership Programme Fellowship 2023.**
3. **DST-SERB Early Career Research Award 2019.**
4. Qualified in **CSIR Junior Research Fellowship 2003.**
5. Qualified in **Graduate Aptitude Test in Engineering (GATE) 2003.**

6. Qualified in **JNU – CEEB** 2001.
7. Recipient of **Republic Day Prashasti Patar (Citation)** 1996.
8. Winner of **Outstanding Team Effort prize** for making reflective type telescope 1995.
9. Our model on “water purification by solar energy” was displayed in the **National Science Exhibition 1995** at Pragati Maidan, New Delhi, and published by **NCERT** 1995.
10. Two-time **First Prize winner in Origami at State Level Science Fair** 1993 & 1994.

### Memberships of Societies

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

### Publication

1. Sharma S, Mishra S, Gourinath S, **Kaushal PS<sup>#</sup>** (2024). Cryo- EM structure of ribosome from pathogenic protozoa *Entamoeba histolytica*, reveals unique features of its architecture. **bioRxiv**: <https://doi.org/10.1101/2024.04.29.591517>
2. Kumar N, Sharma S, **Kaushal PS<sup>#</sup>** (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>.
3. 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). Methotrimeprazine exerts antiviral and neuroprotective effects in Japanese encephalitis virus infection through activation of adaptive ER stress and autophagy. **EMBO Molecular Medicine**. 1:185-217..
4. Arora A, **Kaushal PS<sup>#</sup>**. (2023). Cryo-EM in the study of ribosome biogenesis. **CRC Press Taylor & Francis Group**. Accepted. (Book chapter).
5. 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.
6. 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.
7. Kumar N, Sharma S, **Kaushal PS<sup>#</sup>**. (2021) Protein synthesis in *Mycobacterium tuberculosis* as a potential target for therapeutic interventions. **Mol Aspects Med**. doi: 10.1016/j.mam.2021.101002.
8. 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.
9. 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.
10. Qu G<sup>\*</sup>, **Kaushal PS<sup>\*</sup>**, Wang J<sup>\*</sup>, 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**.

11. **Kaushal PS**, Sharma MR and Agrawal RK. (2015) The 55S mammalian mitochondrial ribosome and its tRNA-exit region. **Biochimie**. 114, 119-26. [Review]
12. **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).
13. 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)
14. 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.
15. **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).
16. 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)
17. **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.
18. **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).
19. **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.
20. **Kaushal PS**, Sankaranarayanan R & Vijayan M. (2008) Water-mediated variability in the structure of relaxed-state haemoglobin. **Acta Crystallographica F64**, 463-9.
21. **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 "Ribosome structure of pathogenic protozoan *Entamoeba histolytica*" at 12<sup>th</sup> RNA group meeting organized by **IIT Guwahati** on May 22-24, 2024.
2. Title "Cryo- EM structure of ribosome from pathogenic protozoan; *Entamoeba histolytica*" at International Conference on Electron Microscopy at **IIT, Bombay**, on May 16-18, 2024
3. Title "Cryo- EM structure of ribosome from pathogenic protozoan *Entamoeba histolytica*" at SATHI Summit: Single Particle CryoEM and Cellular Tomography – 4th

Annual Symposium of CEM3DIP Society of India organized by **SATHI, IIT Delhi** on April 5, 2024.

4. Title "Sorting structural heterogeneity in single-particle cryo- EM data using RELION" at symposium on Understanding the Breathing of Biomolecules: Recent Advances in Cryo-EM and Chemical Biology organized by **IIT Bombay** on March 7-9, 2024
5. Title "Mycobacterial ribosome hibernation: a unique strategy for its survival under hypoxia stress" at symposium on Understanding the Breathing of Biomolecules: Recent Advances in Cryo-EM and Chemical Biology organized by **IIT Bombay** on March 7-9, 2024
6. 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.
7. 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>).
8. Title "*Cryo- electron microscopy (cryo- EM ): the modern technique for the structure determination of biomolecules in atomic resolution*" at Prof. M. Vijayan Meneroal Annual Symposium organized by **SASTRA University Thanjavur** on October 8 -9, 2023.
9. 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.
10. Title "*The unique strategy of mycobacterial ribosome hibernation revealed by cryo- EM*" at 1<sup>st</sup> symposium on Cryo- Electron Microscopy of Biological Systems (CEMBioS Symposium), **NISER, Bhubaneswar**, on February 13–14, 2023.
11. 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.
12. Title "*Dealing structural heterogeneity in cryo- EM data*" at the CEM3DIP meeting, **IISER Pune** on December 17, 2022.
13. Title "*Cryo- EM structure of the mycobacterial ribosome in complex with ribosome hibernation factor, RafH*" at the 49<sup>th</sup> National Seminar on Crystallography, **University of Jammu**, Jammu, on November 28-30, 2022.
14. 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).
15. 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).
16. 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).
17. Title "*The Cryo- EM structure of group II intron*" at the '12th Asia Pacific Microscopy Conference, **HICC Hyderabad**' from February 3 -7, 2020.

18. Title "*Cryo-electron microscopy (cryo-EM) the fast emerging technique in modern biology*" at the **University of Jammu** on May 13, 2019.
19. Title "*Cryo-electron microscopy studies of the ribonucleoprotein complexes: group II intron and ribosomes*" at **IIT Roorkee**, on April 19, 2019.
20. 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.
21. 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.
22. Title "Novel Prize in Chemistry 2017" at **Sir P. T. Sarvajanik college of science, Athwalines, Surat** on February 16, 2018.
23. 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 17<sup>th</sup> 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 75<sup>th</sup> 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 75<sup>th</sup> Year of Indian Independence. Here is the weblink: [https://www.youtube.com/watch?v=uJQGXi\\_HIMk](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 75<sup>th</sup> 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=IwAR2IN4tBo4qavyvVERQI0f2Fgqz-WpLYEh11PyRIUP\\_KuORxH8Yh9A5Bxao](https://www.youtube.com/watch?v=llkaCoz5dnQ&feature=share&fbclid=IwAR2IN4tBo4qavyvVERQI0f2Fgqz-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 6<sup>th</sup> 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\\_-NxvTFoDXxKhTZU28Ic4cfpiChGlrxlyJFWway2-GYXXiQ](https://www.youtube.com/watch?v=aGd1ojLQOO0&feature=share&fbclid=IwAR0T_cgVQ-ip_-NxvTFoDXxKhTZU28Ic4cfpiChGlrxlyJFWway2-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 **11<sup>th</sup> ADNAT Convention on Advances in Structural Biology and Structure Prediction. Hyderabad, India**, on February 23 -25, 2007.