



## Lalit Kumar Gautam, Ph.D.

Post-Doctoral Research Scholar

Anatomy and Cell Biology, Ryan's Lab

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### Education

**Ph.D. (Biotechnology), Panjab University, Chandigarh, India, 2021**

**M.Sc. Biotechnology**, Tilka Manjhi Bhagalpur University, India

**B.Sc. (Zoology, Botany, Chemistry, English)**, Tilka Manjhi Bhagalpur University, India

### Research experience

**Anatomy and Cell Biology, Ryan's Lab, University of Iowa, USA 52242 (2022- present)**

**Designation: Post-Doctoral Research Scholar**

*Responsibilities:*

- Experiment designing and conducting experiments.
- Result analysis, interpretation, drafting and reviewing manuscript.
- Discuss research ideas with mentor and developing proof of concept for grant writing.
- Manuscript and grant writing
- Mentoring graduate and undergraduate students in the lab
- Volunteering reviewing for research journals of the field.

**Department of CSIC, Post-Graduate Institute of Medical Education & Research, Chandigarh, India – 160012 (2021-2022)**

**Designation: Junior Demonstrator**

*Responsibilities:*

- Induction to graduate students about techniques/facilities at CSIC of PGIMER.
- Literature survey and review
- Management of lab activities and maintenance of advanced analytical instruments
- Analysis of biological samples using confocal microscope

**Department of Biotechnology, Panjab University, Chandigarh, India (2013- 2021)**

**Designation: Graduate Research Candidate (Ph.D. Scholar)**

**Thesis:** "Role of polyphosphate kinase in virulence and stress responses of *Acinetobacter baumannii*".

*Research Highlights:*

- Polyphosphates (polyP) are important to produce virulence factors and stress management in bacteria. PolyP is synthesized by polyphosphate kinase (PPK) which is highly conserved among microorganisms. In the absence of PPK orthologue in humans, etoposide and genistein could be sought as novel therapeutic option to supplement the existing antibiotics against *A. baumannii*.
- Virtual screening of synthetic and natural compounds and FDA approved drugs allowed the selection of etoposide and genistein which competitively inhibited AbPPK1 *in vitro* at IC<sub>50</sub> of 27.53 and 24.38 μM, respectively.
- These molecules reduced the production of virulence factors in *A. baumannii*. There was significant ( $p \leq 0.05$ ) reduction in biofilm formation and surface motility in *A. baumannii* ATCC 17978 and the clinical isolates. Genistein in combination with tobramycin

further reduced biofilm formation in *A. baumannii*. Etoposide and genistein led to decrease in survival of *A. baumannii* under desiccation conditions.

- In the absence of PPK orthologue in humans, etoposide and genistein could be sought as novel therapeutic option to supplement existing antibiotics against *A. baumannii*.

**Dr. Rathore's Lab, Gautam Buddha University, Greater Noida, India. 2012-2013**

**Designation: Junior Research Fellow**

*Highlights:*

- Identified, cloned and overexpressed RelBE toxin-antitoxin (TA) homologs and MazEF of *Xenorhabdus nematophila* for investigating their role in survival and programmed cell death.

**Dr. Gourinath's Lab, SLS, Jawaharlal Nehru University, India. 2010-2011**

**Designation: Research intern**

*Highlights:*

- Cloning, over-expression, purification, and crystallization trials of Serine Acetyltransferase 3 (*EhSAT3*) from *Entamoeba histolytica*

#### Skills

**Molecular Biology:** Real-time PCR, Conventional PCR, Plasmid Isolation, DNA isolation, Gene cloning, Restriction Digestion and ligation, recombinant protein expression, Enzyme kinetics, RNA isolation, EMSA, Native and SDS-PAGE, Agarose gel electrophoresis, Affinity chromatography.

**Advanced Instrument:** CLSM Microscopy, CD spectroscopy, Thermal Shift Assay and HPLC.

**Microbiology:** Electroporation, Gram staining, Culture maintenance, Toxicity assays, Competent cell preparation, Plasmid curing, Biofilm formation, Quorum sensing, Desiccation survival assay, Lyophilization.

**Bioinformatics:**

**Molecular Modeling, Docking and Visualisation:** AutoDock Tools, Modeller, Chimera, Discovery Studio (Biovia), PyMOL and Maestro (Schrodinger). Gromacs v4.5 and later

**Online tools:** Clustal Omega, BLAST, ORF finder, NEB cutter, SWISS-Model, Phyre<sup>2</sup>, CASTp, EBI-SAS, MEGA6.

**Programming:** R (R-Studio), UNIX scripting, Git system control.

**Document:** MS office, Libre office (Windows /Linux), Adobe and Foxit PDF reader.

**Operating Systems:** Windows Vista, XP, 7, 8, 10 and 11; Linux/Ubuntu; macOS.

#### Publications

1. Koc-Gunel S, **Gautam LK**, Calvert BA, Murthy S, Harriott NC, Nawroth JC, et al. Sorafenib inhibits invasion of multicellular organoids that mimic Lymphangioliomyomatosis nodules. *bioRxiv*. 2023: doi: [10.1101/2023.06.12.544372](https://doi.org/10.1101/2023.06.12.544372).
2. Quiroz EJ, Kim S, **Gautam LK**, Borok Z, Kintner C, Ryan AL. RBL2 represses the transcriptional activity of Multicilin to inhibit multiciliogenesis. *bioRxiv*. 2023: doi: [10.1101/2023.08.04.551992](https://doi.org/10.1101/2023.08.04.551992).
3. Sidhu, H., **Gautam, L. K.**, & Capalash, N. (2023). Unraveling the molecular mechanism of l-menthol against cervical cancer based on network pharmacology, molecular docking and in vitro analysis. *Molecular Diversity*, 27, 323–340, doi:[10.1007/s11030-022-10429-1](https://doi.org/10.1007/s11030-022-10429-1)
4. **Gautam, L. K.**, Sharma, P., & Capalash, N. (2022). Structural insight into substrate binding of *Acinetobacter baumannii* polyphosphate-AMP phosphotransferase (PPK2), a novel drug

target. *Biochemical and Biophysical Research Communications*, 626, 107-113. doi:[10.1016/j.bbrc.2022.07.090](https://doi.org/10.1016/j.bbrc.2022.07.090)

5. Kaur A, **Gautam L. K.**, Balda S., Capalash N., Sharma P. (2022). Triclosan controls pleiotropically the paper-deteriorating bacterial community in paper mill *International Biodeterioration & Biodegradation* 173 (105455) doi:[10.1016/j.ibiod.2022.105455](https://doi.org/10.1016/j.ibiod.2022.105455).
6. **Gautam LK**, Sharma P and Capalash N, "Attenuation of *Acinetobacter baumannii* virulence by inhibition of polyphosphate kinase 1 with repurposed drugs" *Microbiological Research*, 2021, 242, 126627. doi: [10.1016/j.micres.2020.126627](https://doi.org/10.1016/j.micres.2020.126627).
7. Nim JS, Mohit Yadav **Gautam LK**, Ghosh C, Sahi S and Rathore JS, "Novel Toxin-antitoxin System Xn-mazEF from *Xenorhabdus nematophila*: Identification, Characterization and Functional Exploration", *Current Computer-Aided Drug Design* (2021) 17 (3): 402-411. doi:[10.2174/1573409916666200625135850](https://doi.org/10.2174/1573409916666200625135850).
8. **Gautam LK**, Sharma P and Capalash N, "Bacterial Polyphosphate kinases Revisited: Role in Pathogenesis and Therapeutic Potential" *Current Drug Targets*, 2019;20(3):292-301. doi: [10.2174/1389450119666180801120231](https://doi.org/10.2174/1389450119666180801120231).
9. **Gautam LK**, Yadav M and Rathore JS, "Functional annotation of novel toxin-antitoxin system Xn-RelT of *Xenorhabdus nematophila*; a combined *in silico* and *in vitro* approach," *Journal of Molecular Modeling*, 2017, 23: 189. doi:[10.1007/s00894-017-3361-5](https://doi.org/10.1007/s00894-017-3361-5).
10. **Gautam LK**, Yennamalli RM and Rathore JS, "Implication on the function of novel Xn-relE toxin structure of *Xenorhabdus nematophila* using homology modeling," *Current Bioinformatics*, Vol. 12 (6), 535 - 542, 2017, doi:[10.2174/1574893611666160620093520](https://doi.org/10.2174/1574893611666160620093520).
11. Rathore JS and **Gautam LK**, "Expression, Purification, and Functional Analysis of Novel RelE Operon from *X. nematophila*," *The Scientific World Journal*, vol. 2014, Article ID 428159, 2014. doi:[10.1155/2014/428159](https://doi.org/10.1155/2014/428159).

#### Book Chapter:

1. **Gautam, L. K.**, Harriott, N. C., Caceres, A. M. and Ryan, A. L. (2023) Basic Science Perspective on Engineering and Modeling the Large Airways in Book "Engineering Translational Models of Lung Homeostasis and Disease", Springer: Publisher, 978-3-031-26624-9. [10.1007/978-3-031-26625-6\\_5](https://doi.org/10.1007/978-3-031-26625-6_5) doi: [10.1007/978-3-031-26625-6\\_5](https://doi.org/10.1007/978-3-031-26625-6_5)

#### Protein structure models:

1. *Xenorhabdus nematophila* RelE-AT, DOI: [10.5452/ma-abgt9](https://doi.org/10.5452/ma-abgt9)
2. *Xenorhabdus nematophila* RelE-T, DOI: [10.5452/ma-azcde](https://doi.org/10.5452/ma-azcde)
3. Xn-RelT in complex with Xn-RelAT. DOI: [10.5452/ma-aoz7i](https://doi.org/10.5452/ma-aoz7i)
4. Xn-RelT in complex with RNA substrate. DOI: [10.5452/ma-a9aoo](https://doi.org/10.5452/ma-a9aoo)

Git-Hub Repository: <https://github.com/gautam-lk>

#### Work presented at conferences/proceedings:

- **Gautam LK**, Quiroz EJ, Ryan AL, "Notch inhibition influences the activity of Multicilin in regulating cilia assembly and function in human airway epithelial cells" at *Stem Cells, Cell Therapies, and Bioengineering in Lung Biology and Diseases Conference* at University of Burlington, VT, USA, July 17 - 20, 2023.
- **Gautam LK**, Sharma P and Capalash N, "Pharmacophore based screening and identification of natural compounds for inhibition of *Acinetobacter baumannii* polyphosphate kinase (AbPPK) and *in vitro* validation" at 6<sup>th</sup> Biennial international conference "DDNPTM - 2018" at NIPER, Mohali, Panjab, India, 15-17 Nov 2018.

- **Gautam LK**, Sharma P and Capalash N, “Identification of high affinity inhibitors of *Acinetobacter baumannii* polyphosphate kinase (AbPPK) through virtual screening” at 11<sup>th</sup> Chandigarh Science Congress (CHASCON 2017) at Panjab University, Chandigarh, India, 9-11 Mar 2017.
- **Gautam LK**, Sharma P and Capalash N, “An insight into *Acinetobacter baumannii* polyphosphate kinase (AbPPK) structure and its protein ligand complex: an *in-silico* approach for inhibitor screening” at 10<sup>th</sup> Chandigarh Science Congress (CHASCON 2016) at Panjab University, Chandigarh, India, 29 Feb- 2 Mar 2016.

### Workshop

1. Midwest Advanced Minflux and Super Resolution Workshop at University of Illinois Urbana-Champaign, 30<sup>th</sup> May - 2<sup>nd</sup> June 2023
2. “Writing about Science for Non-Scientific Audiences” at the Science Media Centre, IISER Pune, 07- 11 December 2020.
3. “Film-making as a tool for Science Communication” at The Science Media Centre, IISER Pune, 14 - 18 September 2020.
4. “R - Programming & its application in Biomedical research at Pathfinder Research and Training foundation, Greater Noida, 07-09 August 2020.
5. “Whole genome assembly, annotation, comparative genomics, machine learning and immunoinformatics” at Nextgenhelper, New Delhi, 25-28 July 2020.
6. “Small Angle X-ray Scattering (NSAXS – 2017)” at Department of SAIF, Panjab University, Chandigarh, 6 - 8 November 2017.
7. “Advanced Techniques in Protein Design and Engineering” at IISER Mohali, 14- 18 March 2016.
8. “Biorisk Management Trainer Development Program Curriculum Development Track” organized by International Biological Threat Reduction (IBTR), Sandia National Laboratories, USA and Panjab University, Chandigarh; 14- 18 December 2015.
9. “Transportation Workshop *including: The Class 6.2 Dangerous Goods Shipping General awareness and function specific training*” organised by International Biological Threat Reduction (IBTR), Sandia National Laboratories USA and Panjab University, Chandigarh; 4-5 April 2014.
10. "International Workshop on BioRisk Management" organised by International Biological Threat Reduction (IBTR), Sandia National Laboratories USA and Panjab University, Chandigarh; 3-9 April 2014.

### Awards and Achievements

- Selected for Research Fellowship in Sciences for Meritorious Students (RFSMS) scheme 2013 by UGC, Govt. of India for pursuing Ph.D. in Dept. of Biotechnology, Panjab University, India
- Haryana Science and Technology Awards of Fellowship (Life Science) 2012.
- CSIR - National Eligibility Test (NET) June 2011: Rank-031
- GATE - Life Science: 2011: Rank-503, Percentile – 96.2

### Membership of Scientific Societies

Life member (L31963) - Indian Science Congress Association, India  
 Life member (4749-2018) - Association of Microbiologist of India (AMI)  
 Session member - American Society of Microbiology (ASM), USA

### Reviewer

Current Research in Microbial Sciences (Elsevier)  
 Journal of Molecular Modeling (Springer Nature)

Current Bioinformatics (Bentham Science Publisher)  
The Applied Biology & Chemistry Journal (TAB CJ)  
SVOA Microbiology (Science Volks Publications)  
Computational Biology and Bioinformatics (Science Publishing Group)  
Canadian Journal of Infectious Diseases and Medical Microbiology

#### **Editorial Role**

The Applied Biology & Chemistry Journal (TAB CJ)  
Syncytia

#### **Administrative responsibilities**

- Core Planning Committee Member, “BADLAV Foundation, India” – An organization for basic human rights to education, social reforms through education, training & awareness campaigns (2018 – onwards, invited position) (<http://badlav.in/badlav-team/>)
- Nominated Member, Grievance/complaints redressal cell of Panjab University Campus Student’s Council Election (2018-2019)
- Secretary, Environmental Society, Department of Biotechnology, Panjab University (2015-2017)
- Lab-in-charge (Faculty): Bio-analyzer, ELISA reader and Gel Documentation lab, Department of CSIC, PGIMER, India (2021- 2022)
- In-charge: Purchase of small-scale instruments at CSIC, PGIMER, India (2021- 2022)

#### **Research Profiles**

**Google Scholar:** <https://scholar.google.com/citations?user=ZRTSpRwAAAAJ&hl=en>

**ORCID:** <https://orcid.org/0000-0002-6606-4408>

**Scopus:** <https://www.scopus.com/authid/detail.uri?authorId=57205694619>

**ResearchGate:** [https://www.researchgate.net/profile/Lalit\\_Gautam](https://www.researchgate.net/profile/Lalit_Gautam)

**Website:** <https://lkg.netlify.app/>