Translational Molecular Medicine Lab

Prof Jayanth Kumar
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EDUCATION

MBBS, Medicine and Surgery (2000-2006)
Government Stanley Medical College,
Chennai, Tamil Nadu

MD, Biochemistry**,** (2007-2010)
All India Institute of Medical Sciences (AIIMS), New Delhi.

PROFESSIONAL EXPERIENCE

Senior Demonstrator (2010-2012)
Department of Biochemistry, AIIMS, New Delhi

Postdoctoral Research Fellowship (2012-2014)
Department of Pathology and Lab Medicine
David Geffen School of Medicine at UCLA, Los Angeles, California

Assistant Professor (2014-2017)
Associate Professor (2017-2020)
Additional Professor (2020-2024)
Professor (2024-Present)
Department of Biochemistry, AIIMS, New Delhi

Research Focus of the Lab

Our lab focuses on multiple research questions whose answers hopefully will lead to a translational utility.

a) **RNA binding proteins and Epitranscriptomics:** The focus of our lab is in understanding the role of RNA binding proteins and RNA methylation in the pathogenesis of B-cell acute lymphoblastic leukemia/lymphoma (ALL). This is a disease of the pediatric age group and is a major health problem worldwide. RNA binding proteins (RBPs) regulate gene expression post-transcriptionally. Our studies have identified the IGF2BP family of RBPs to be highly expressed in B-ALL. Our work has also identified that the percentage of methylated RNAs (m6A) is very high in B-ALL. We are attempting to decipher how these RBPs are overexpressed in B-ALL and what their role is in the pathogenesis of the disease in conjunction with RNA methylation. This is done using various clinical samples and various *in-vivo* and *in-vitro* techniques.

b) **Gene Therapy:** Our lab also works on devising gene therapies for inborn errors of metabolism using CRISPR based viral vectors. At present, we are working on Gaucher's disease as a model for the same.

c) **Rare disease characterization:** Our lab is also part of a team at AIIMS which helps in molecular characterization of rare diseases in pediatrics. Novel mutations are analyzed and their functional role established using various molecular biology techniques.

Our Team

1. **Scientists and Postdoctoral Fellows**

A. **Dr Sumedha Saluja:** Dr Sumedha is an ICMR project scientist II. She joined the lab in March 2018 and did her PhD in the lab. She was also awarded an ICMR fellowship for pursuing her PhD degree. She is currently investigating the role of the epitranscriptome and the IGF2BP family of RNA-Binding Proteins in B-cell Acute Lymphoblastic Leukemia. She has a Master in Biochemistry from AIIMS and a thesis on stem cells and cancer. During her MSc, she was awarded the UGC Postgraduate Merit Scholarship for University Rank Holder, and she was a University Gold Medalist in Biomedical Sciences.

B. **Dr Ramani Shyam:** Dr Ramani is an ICMR project scientist-II. She is working on using CRISPR screens to rapidly identify therapeutic vulnerabilities in B-ALL. She is also a bioinformatician and performs sequencing analysis.

C. **Mahaiwon Shadang:** Mahaiwon is an ICMR Project Scientist-I who is working on developing various gene therapies for inborn errors

D. **Christine Wilson:** Christine is an ICMR Project Scientist-I who is working on CRISPR screens to rapidly characterize leukemia specific genes as well as on developing CAR-T cells in breast cancer

2. **Graduate Students**

a. **Ishu Bansal**: Ishu is a fifth-year PhD student and ICMR-SRF who joined the lab in May 2021. She is investigating the role of the IGF2BP family of RNA-binding proteins in modulating the PI3K pathway in B-cell Acute Lymphoblastic Leukemia.

b. **Mohammad Sabique Beg**: Sabique is a fifth-year PhD student and DBT-SRF who joined the lab in May 2021. He is working on using CRISPR-directed therapies to silence IGF2BP3 in cancer cell lines.

c. **Ruchi Bhardwaj**: Ruchi is a third-year PhD student and a DBT-JRF. She joined the lab as a graduate student in March 2023 and works on identifying gene networks perturbed by m6A modifications in B-ALL. She also did a Master's in Biochemistry (2019-2021) from our lab and worked on investigating the synergistic role of IGF2BP1/3 and METTL14 in leukemogenesis.

d. **Tanu Bansal**: Tanu is a third-year PhD student and a DBT-JRF. She joined the lab as a graduate student in March 2023. She works on designing synthetic circuits to target B-ALL.

e. **Tejaswini Choudhury:** Tejaswini is a first year PhD student. She is working on creating synthetic circuits to identify soluble antigens and target them.

3. **Dr Reddipalli Sharath:** Dr Sharath is a senior resident who joined the lab in February 2021. He worked on deciphering the synergism between epitranscriptomic modifications and IGF2BPs in the stability of mRNAs. He is also a first-year PhD student and is working on developing CRISPR-directed AAV-based therapies for Gaucher's disease.

4. **Master's Students: Saumya** is an MSc student working on the Cytosine DNA Base Editing approach to correct the L483P mutation in Gaucher disease and compare efficiency with CRISPR-directed RNA editing.

5. **Project Associates:**

a. **Anjli Gaur** is a DHR project associate working on identifying the role of relapse-specific genes in B-ALL.

b. **Mahek Farhan** is a DST-SERB project associate working on a lentiviral-based DNA and RNA editing approach to correct Gaucher's disease. She also completed her MSc. from our lab (2022-2024) and worked on designing an RNA-targeted CRISPR-based strategy to reverse the phenotype in Gaucher's disease.

6. **Lab technicians:**

Nitesh and Pappu Prasad are lab technicians who help in patient sample collection, processing, and data collation as well as in various other roles in the lab.

Alumni:

1. **Dr. Elza Boby**: Elza was a Junior resident in the Biochemistry Department (2015-2018). For her dissertation in our lab, she worked on the Role of IGF2BP1 in ETV6-RUNX1 translocation positive B-ALL. She now works as an Assistant Professor at Calicut Medical College in the Department of Biochemistry.

2. **Dr Sanjeev Goswami:** Sanjeev worked on the 'Role of IGF2BP3 in the invasion and migration of cancer cells' during his Masters in Biochemistry (2016-2018) in our lab. He recently completed his PhD in Prof Kunzang Chosdol's lab in Biochemistry at AIIMS, New Delhi.

3. **Dr Thakur Nidhi:** Nidhi was a Junior Resident in the Biochemistry Department (2016-2019). For her dissertation, she worked on the Role of EGFL7 in ETV6-RUNX1 translocation positive B-ALL. She is presently a Senior Resident at ESIC, Faridabad.

4. **Harsh Bhakhri:** Harsh worked on 'The role of METTL3 and IGF2BP synergism in leukemogenesis' during his Masters in Biochemistry (2019-2021) in our lab. He is presently enrolled as a PhD student in Prof Kalpana Luthra's lab in Biochemistry at AIIMS, New Delhi.

5. **Dr Gunjan Sharma:** Gunjan was the first PhD student from the lab. She worked on elucidating the role of IGF2BP1 in ETV6-RUNX1 translocation-positive pediatric patients. She was a DBT-JRF/SRF and a winner of the SERB overseas visiting doctoral fellowship. She is presently a postdoctoral fellow at UCLA.

6. **Hemant Kumar:** Hemant was a Masters student in the lab. He did his dissertation on the role of circRNAs in hypoxia. He is currently a PhD student at PGIMER, Chandigarh.

7. **Diya Chawla:** Diya was a Master's student in the lab. Her dissertation involved the development of a monocyte-derived macrophage model for Gaucher's disease.

8. **Nisha Kushwaha**: Nisha was a Masters student in the lab. She worked on validating the expression of relapse-specific genes in a large cohort of archival patient samples.

9. **Dr Kriti Kaushik:** Postdoctoral Research Fellow (DHR Young Scientist-III) (2018-2024)
Kriti joined the lab as a DBT-Research Associate (fellowship) in 2018 and worked on deciphering the role of long non-coding RNAs in regulating IGF2BP3 in aggressive cancers. She expanded her research

investigation as a DHR Young Scientist to study another class of non-coding RNAs i.e. circular RNAs bound with IGF2BP3 and their mechanism of action in promoting metastasis during hypoxia in leukemia patients. She is currently working in Premas Life Sciences.

10. **Arjun Saraswat and Lajja Patel**: Arjun and Lajja were MBBS students selected by the institute's UG Mentorship Research Scheme. They worked on the role of IGF2BP3-associated circular RNAs in hypoxia and epithelial-to-mesenchymal transition.

Positions Available

We are always on the lookout for excellent postdoctoral/graduate students. If you are interested in the type of work which we do and have an idea which you wish to work on, please drop an email to *drjayanth@aiims.edu*. MBBS students for summer fellowships and short-term training are always welcome if you are willing to put in the hard work 😊. Visiting internships/observerships are closed as of now.

Key publications

1. Aberrant overexpression of m6A writer and reader genes in pediatric B-Cell Acute Lymphoblastic Leukemia (B-ALL). Saluja S, Ganguly S, Sharma G, Singh J, Jain A, Chaudhary S, Karthikeyan P, Chattopadhyay P, Chopra A, Singh A, Karmakar S, Bakhshi S, **Palanichamy JK**. *Translational Oncology (2025) 56:102403*
2. Hypoxia increases the biogenesis of IGF2BP3-bound circRNAs. Kaushik K, Kumar H, Mehta S, **Palanichamy JK**. *Molecular Biology Reports (2024) 51(1):288*
3. Inflammation as a driver of hematological malignancies. Saluja S, Bansal I, Bhardwaj R, Beg MS, **Palanichamy JK**. *Front Oncol. (2024) 14:1347402*.
4. RNA binding protein IGF2BP1 synergizes with ETV6-RUNX1 to drive oncogenic signaling in B-cell Acute Lymphoblastic Leukemia. Sharma G, Tran TM, Bansal I, Beg MS, Bhardwaj R, Bassi J, Tan Y, Tso C, Jaiswal AK, Jain A, Singh J, Chattopadhyay P, Singh A, Chopra A, Bakhshi S, Casero D, Rao DS, **Palanichamy JK**. *Journal of Experimental and Clinical Cancer Research (2023) 42:231*
5. Distinct oncogenic phenotypes in hematopoietic specific deletions of Trp53. **Palanichamy JK**, Tran TM, King JK, Katzman S, Ritter AJ, Sharma G, Tso C, Contreras JR, Fernando TR, Sanford J, Rao DS. *Scientific Reports (2023) 13: 7490*
6. Mosaic variegated aneuploidy syndrome 2 with biallelic novel CEP57 splice site variation in Indian siblings: Expanding the clinical and molecular spectrum. Langeh N, Saluja S, Ethayathulla AS, Jana M, Shukla R, **Palanichamy JK***, Gupta N*. *Clinical Genetics (2023) 103(4): 478-483 (*Equal Authorship)*
7. Diagnostic utility of IGF2BP1 and its targets in ETV6-RUNX1 positive B-cell Acute Lymphoblastic Leukemia. Sharma G, Boby E, Nidhi T, Jain A, Singh J, Singh A, Chattopadhyay P, Bakhshi S, Chopra A, **Palanichamy JK*.** *Frontiers in Oncology (2021) 11:588101*
8. The RNA binding protein IGF2BP3 is required for MLL-AF4 mediated leukemogenesis. Tran TM, Philipp J, Bassi J, Nibber N, Draper J, Lin T, **Palanichamy JK**, Kumar A, Paing M, King JK, Katzman S, Sanford JR, Rao DS. *Leukemia (2021) 36(1):68-79*
9. A patient with the POLA1 splice variant expands the yet evolving phenotype of Van Esch-O'Driscoll syndrome. Monika E, Saluja S, Ethayathulla AS, Sapra S, Dalal A, **Palanichamy JK***, Gupta N*. *European Journal of Medical Genetics (2021) 64(8):104261 (*Equal Authorship)*
10. RNA-binding protein IGF2BP3 targeting of oncogenic transcripts promotes hematopoietic progenitor proliferation. **Palanichamy JK**, Tran TM, Howard JM, Contreras JR, Fernando TR, Sterne-Weiler T, Katzman S, Touloue M, Yan W, Basso G, Pigazzi M, Sanford JR, Rao DS. *Journal of Clinical Investigation (2016)126(4): 1495-511*

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