Laboratory of Liver Disease Signaling and Immunology (LLDSI)



About the Principal Investigator:

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RESEARCH INTERESTS

Liver Disease and Organ Dysfunction- Mechanisms, Signaling and Biomarkers

Our group's research is driven by a central question: how do systemic metabolic disturbances reshape immune function and contribute to organ injury in chronic inflammatory diseases? The laboratory focuses on deciphering the molecular dialogue between metabolism and immunity in conditions such as acute-on-chronic liver failure (ACLF), metabolic dysfunction–associated steatotic liver disease (MASLD/NAFLD), liver fibrosis, liver cancer and sepsis. Using integrative multi-omics approaches combining lipidomics, proteomics, transcriptomics, metabolomics, cell biology and functional immunology, the group seeks to understand how circulating metabolic mediators influence immune cell behavior, inflammatory signaling, and disease progression. A major theme emerging from the laboratory's work is the role of altered lipid landscapes in modulating innate immune responses, particularly neutrophil activation, immune dysfunction, and multi-organ injury in severe liver disease.

Additionally, by integrating patient-derived clinical samples with experimental biology and computational analyses, our group aims to bridge mechanistic discovery with translational application. Ongoing research efforts are directed toward identifying clinically relevant biomarkers and therapeutic targets that may improve disease stratification, prognostication, and precision medicine approaches in hepatology and systemic inflammatory disorders. Current areas of investigation include receptor-mediated inflammatory signaling, transcriptional regulation of immune dysfunction, immunometabolic mechanisms underlying tissue injury and oncogenic transformation, and the impact of environmental and metabolic stressors on hepatic disease biology. Through systems-level analyses grounded in clinically relevant questions, the laboratory seeks to generate biologically meaningful insights with direct translational relevance to human disease.

Our work is supported by funding from various organizations such as ANRF, DBT, BIRAC, DHR and AYUSH, Govt. of India. We are grateful to all the funding agencies for their generous support.

AWARDS AND HONORS

- Editorial Board Member, Journal of Clinical and Experimental Hepatology (INASL)
- AIIMS Research Excellence Award 2025.
- Indian Immunology Society Recognition for "Women in Immunology" 2025.
- Women Lift Health Leader 2023
- Indian National Association for the Study of the Liver (INASL) 2022 Plenary Session Award for our work on biomarkers of acute kidney injury (AKI) in acute-on-chronic liver failure (ACLF)
- Indian National Association for the Study of the Liver (INASL) 2021 Plenary Session Award for our work on neutrophil phenotypes in acute-on-chronic Liver Failure (ACLF).
- Fellows Award for Research Excellence 2015- sponsored by the NIH Scientific Directors, the Office of Intramural Training & Education and FelCom/NIH.
- Fellowship in the Khorana Nirenberg Scholars Program (US-India Career Transition Award- sponsored by DBT, India and NIH, USA) 2011
- Ranbaxy Science Scholar 2010

SOCIETY MEMBERSHIPS

- Indian Society of Translational Research
- Proteomics Society of India
- Human Proteome Organization (Scientific Advisory Board Member 2026)
- Indian Immunology Society
- Indian National Association for the Study of the Liver

LAB MEMBERS (current):



(L to R): Shreya Dubey (M.Sc. student), Nidhi Gauniyal (Ph.D scholar), Sonali Mukherjee (Ph.D scholar), Jatin Parmar (DEO), Zeba Sajid (Ph.D scholar), Gitanjali R (M.D. student). Front row, seated: Dr. Pragyan Acharya

WHAT THEY DO:

- **Nidhi Gauniyal-** Uncovering minimally invasive biomarkers for MASLD progression. Becoming our in-house expert in targeted proteomics.
- **Sonali Mukherjee-**Unraveling the complexities of inflammation signaling complexes in ACLF. Sonali has made great strides in optimizing complex immune receptor signaling assays.
- **Zeba Sajid -**Our newest PhD student, Zeba is embarking upon a systematic study of metabolic signaling in liver cells in MASLD.
- **Gitanjali R-** Our talented M.D. student who is doing benchmarking studies for emerging biomarkers in MASLD.
- **Shreya Dubey** – Our youngest member, M.Sc. student in Medical Biochemistry, is uncovering protein isoforms in ACLF.
- **Sudhanshu Jha-** A fresh M.Sc., Sudhanshu is trying to develop *in silico* approaches to interrogate lipid-protein interactions.
- **Jatin Parmar-** the DEO of our lab, who keeps things running. Definitely the busiest member of our lab.

SELECTED PUBLICATIONS

As Corresponding author; * As First Author

1) Swaroop S, Biswas S, Aggarwal A, Coshic P, Kumar S, Agarwal S, Pandey HC, Patidar G, Chaurasia R, Arora U, Agarwal A, **Acharya P**, Nayak B, Gunjan D, Sardana V, Mishra AK, Gamanagatti S, Shalimar. **Therapeutic plasma exchange improves short-term survival in patients with acute-on-chronic liver failure:** A randomized controlled trial. *Hepatology*. **2026** Mar 30. doi: 10.1097/HEP.0000000000001755.
2) Verma N, Acharya P. Editorial: **Decoding Gut Failure in Cirrhosis: Villin-1 and the Emergence of a Seventh Organ Failure.** *Aliment Pharmacol Ther*. **2026** Apr;63(7):1042-1043. doi: 10.1111/apt.70501.
3) Saha R, Priyadarshini S, Shalimar, **Acharya P**[#]. **The influence of biological sex on diagnostic markers of acute kidney injury in acute-on-chronic liver failure: insights from a single-centre tertiary care study**. *Ren Fail*. **2025** Dec;47(1):2553813. doi: 0.1080/0886022X.2025.2553813.
4) **Acharya P**[*#]**. Preventing malaria by administering a monoclonal antibody.** *Natl Med J India*. **2024** Sep-Oct;37(5):259-260. doi: 10.25259/NMJI_679_2024.
5) Saha R, Sharma S, Mondal A, Sati HC, Khan MA, Mahajan S, Datta S, Shalimar, **Acharya P**[#]. **Evaluation of Acute Kidney Injury (AKI) Biomarkers FABP1, NGAL, Cystatin C and IL-18 in an Indian Cohort of Hospitalized Acute-on-chronic Liver Failure (ACLF) Patients.** *J Clin Exp Hepatol*. **2025** May-Jun;15(3):102491. doi: 10.1016/j.jceh.2024.102491.
6) **Acharya P**[*#], Roshan A. **Lean NAFLD: Do We Need to Lean-in Deeper to Manage it Better?** *J Clin Exp Hepatol*. **2024** Jan-Feb;14(1):101262. doi: 10.1016/j.jceh.2023.07.415. Epub 2023 Jul 27.
7) **Acharya P**[*#], Saha R, Quadri JA, Sarwar S, Khan MA, Sati HC, Gauniyal N, Shariff A, Swaroop S, Pathak P, Shalimar. **Quantitative plasma proteomics identifies metallothioneins as a marker of acute-on-chronic liver failure associated acute kidney injury.** *Front Immunol*. **2023** Jan 26;13:1041230. doi: 10.3389/fimmu.2022.1041230.
8) Saha R, Pradhan SS, Shalimar, Das P, Mishra P, Singh R, Sivaramakrishnan V, **Acharya P**[#]. **Inflammatory signature in acute-on-chronic liver failure includes increased expression of granulocyte genes ELANE, MPO and CD177.** *Sci Rep. **2021.*** Sep 22;11(1):18849. doi: 10.1038/s41598-021-98086-6.
9) **Acharya P***[#], Chouhan K, Weiskirchen S and Weiskirchen R[#] **Cellular Mechanisms of Liver Fibrosis.** *Front. Pharmacol. **2021*** 12:671640. doi: 10.3389/fphar.2021.671640
10) Mandage R, Pramanik A, Kaur C, Sinha V, Kodan P, Singh A, Saha A, Pandey S, Wig N, Pandey RM, Soneja S, **Acharya P[#]. Association of Dengue and Leptospira Co-infections with Malaria Severity**. *Emerging Infectious Diseases **2020.*** 26; 8; https://doi.org/10.3201/eid2608.191214
11) Kaur, C, Pramanik, A, Kumari, K, Mandage R, Dinda A.K, Sankar, J, Bagga A, Agarwal, S.K., Sinha A., Singh G, **Acharya P[#]. Renal detection of *Plasmodium falciparum*, *Plasmodium vivax* and *Plasmodium knowlesi* in malaria associated acute kidney injury: a retrospective case–control study**. *BMC Research Notes **2020*** 13, 37; doi:10.1186/s13104-020-4900-1
12) Singh A, Pramanik A, **Acharya P**, Makharia GK. **Non-Invasive Biomarkers for Celiac Disease.** *Journal of Clinical Medicine **2019*** Jun 21;8(6). pii: E885; doi:10.3390/jcm8060885
13) **Acharya P*,** Kutum R, Pandey R, Mishra A, Saha R, Munjal A, Ahuja V, Mukerji M, Makharia GK. **First Degree Relatives of Patients with Celiac Disease Harbour an Intestinal Transcriptomic Signature that Might Protect them from Enterocyte Damage**. *Clinical and Translational Gastroenterology **2018*** Oct 8;9(10):195. doi: 10.1038/s41424-018-0059-7

14) Alampalli S, Grover M, Chandran S, Tatu U, **Acharya P#. Proteome and Structural Organization of the Knob Complex on the Surface of the *Plasmodium* Infected Red Blood Cell**. *Proteomics- Clinical Applications* ***2017*** Oct 5. doi: 10.1002/prca.201600177
15) **Acharya P#,** Garg M, Kumar P, Munjal A, Raja KD. **Host-Parasite Interactions in Human Malaria: Clinical Implications of Basic Research.** *Frontiers in Microbiology* ***2017*** May 18;8:889. doi: 10.3389/fmicb.2017.00889. eCollection. Review.
16) **Acharya P***, Chaubey S, Grover M, Tatu U. **An exported heat shock protein 40 associates with pathogenesis-related knobs in Plasmodium falciparum infectederythrocytes**. *PLoS One* ***2012***;7(9):e44605.
17) **Acharya P***, Pallavi R*, Chandran S, Dandavate V, Sayeed S K, Rochani A, Acharya J, Middha S, Kochar S, Kochar D, Ghosh S K, Tatu U. ***PLoS One*** **2011**; 6(10):e26623. *These authors have contributed equally.
18) **Acharya P*,**Pallavi R*, Chandran S, Chakravarti H, Middha S, Acharya J, Kochar S, Kochar D, Subudhi A, Boopathi A P, Garg S, Das A, Tatu U. ***Proteomics -Clinical Application*** **2009** Nov; 3(11):1314 25.*These authors have contributed equally. **[Selected as "Editor's Choice" in *Science* (2010) Vol.327, pp 13.]**
19) Pallavi R, **Acharya P***, Chandran S, Daily JP, Tatu U. Chaperone expression profiles correlate with distinct physiological states of Plasmodium falciparum in malaria patients. ***Malaria J*****ournal 2010** Aug 19;9: 236.
20) Pesce E R, **Acharya P**, Tatu U, Nicoll W S, Shonhai A, Hoppe H C, Blatch G L. ***International Journal of Biochemistry and Cell Biology*** **2008**; 40(12): 2914-26.
21) **Acharya P*,** Kumar R, Tatu U. Chaperoning a cellular upheaval in malaria: heat shock proteins in Plasmodium falciparum. ***Molecular and Biochemical Parasitology*** **2007** Jun; 153(2):85-94. Epub 2007 Jan 17. Review.

Book Chapters

1. Duffy P E, **Acharya P** and Oleinikov A. Cytoadherence of the Malaria Parasite. **Encyclopedia of Malaria. Springer Publications. 2015.**

2. **Acharya P*,** Grover M and Tatu U. Systems Biology of Malaria. **Encyclopedia of Systems Biology. Springer Publications. 2013**.