Johan Ajnabi

PhD Candidate | Epithelial Biology, Mechanobiology and Epigenetics

BRIC-Institute for Stem Cell Science and Regenerative Medicine (inStem)
GKVK Post, Bellary Road, Bengaluru - 560065, Karnataka, India
contact@johanajnabi.com Google Scholar johanajnabi johanajnabi.com

Summary

Mechanobiology and epigenetics researcher investigating the mechanistic basis by which mechanical forces regulate chromatin organization and cell fate transitions during tissue repair. Identified a mechanosensitive regulatory mechanism controlling DNMT3a nucleocytoplasmic partitioning and linking cytoskeletal dynamics to epigenetic reprogramming. Integrates quantitative live-cell imaging, molecular perturbation, and cell biology to define how tissue architecture governs regeneration and disease.

Education

PhD Candidate, BRIC-Institute for Stem Cell Science and Regenerative Medicine (inStem) — *2019 – Present*
Advisor: Prof. Colin Jamora
PhD thesis: Regulation of DNMT3a localization in the cutaneous wound healing response
Thesis submission expected: March 2027

M.Sc. in **Molecular Biology and Biotechnology**, ICAR-Indian Agricultural Research Institute — *2019*

B.Sc. (Hons.) in **Agriculture**, Bidhan Chandra Krishi Viswavidyalaya — *2017*

Research Experience

BRIC-Institute for Stem Cell Science and Regenerative Medicine (inStem), India

Research Scholar (PhD) — *2019 – Present*
Advisor: Prof. Colin Jamora

Mechanotransduction and epigenetic regulation (Primary project)

- Demonstrated that wound-induced actin cable shortening drives ERK1/2 inactivation through DUSP6, unmasking a phosphorylation-dependent NLS on DNMT3a (pS255) and promoting its nuclear import in primary epidermal keratinocytes.
- Dissected the pathway using pharmacological perturbations (Blebbistatin, Jasplakinolide, MEK/ERK inhibitors, BCI), constitutively active H-Ras^{G12V}, and DNMT3a phospho-mutants (S255A/S255D); quantified actin and DNMT3a localization by confocal microscopy (Olympus FV3000) and FRAP.
- Led the first-author study (bioRxiv: Ajnabi *et al.*, 2026); presented as a talk at ICMMB 2026.

Stem cell signaling and niche regulation

- Contributed to two stemness studies on Mindin-mediated keratinocyte signaling: (i) the F-Spondin domain of Mindin drives Src-dependent αM-integrin endocytosis; early endosomal acidification shifts the integrin to a signaling-competent conformation to activate STAT3 and maintain keratinocyte stemness (Cell Communication and Signaling: Dam *et al.*, 2026); (ii) Snail-expressing keratinocytes secrete Mindin in an autocrine loop activating Src-STAT3 via CD11b (ITGAM); disrupting this pathway attenuated tumorigenesis in human cSCC models (Cell Reports: Badarinath *et al.*, 2022).
- In both studies, contributed to primary keratinocyte culture, immunofluorescence imaging, and functional assays for stem-cell markers.

Tissue-scale and translational biology (vitiligo, fibrosis)

- Contributed to a NanoString GeoMx Digital Spatial Profiler study of lesional vitiligo skin before and after NB-UVB therapy; CD3-guided ROIs revealed suppression of the IFN-γ/CXCL10 axis, depletion of CD8+ tissue-resident memory T cells (Clinical & Translational Immunology: Dutta *et al.*, 2026).
- Contributed to a SNAI1-transgenic mouse study showing that keratinocyte-secreted Mindin drives early inflammatory cytokine production and collagen deposition in dermal fibroblasts, reproducing cutaneous features of systemic sclerosis (Journal of Investigative Dermatology: Rana *et al.*, 2023).

Host-pathogen interactions

- Contributed to producing VSV/spike pseudotyped lentiviruses (ZsGreen reporter) and running transduction assays in Caco-2 cells with Attune NxT flow cytometry, showing niacinamide enhances LL-37-mediated SARS-CoV-2 membrane disruption (Frontiers in Immunology: Bhatt *et al.*, 2023).

ICAR-National Institute for Plant Biotechnology, India *2017–2019*

M.Sc. dissertation

Advisor: Prof. Monika Dalal

- Characterized promoter cis-regulatory regions controlling *PM19* expression in wheat using molecular cloning, transient GUS assays, plant tissue culture, transformation, and sequence analysis (Thesis: Ajnabi J, 2019)

Publications

First-Author & Lead Contributions

1. **Ajnabi J**, Dam B, Gupta E, Saha T, Dutta A, Kumar S, Gupta A, Palakodeti D, Jamora C. *Actin-dependent mechanotransduction controls nucleocytoplasmic partitioning of DNMT3a through ERK1/2 signaling during cutaneous wound healing.* **bioRxiv**, 2026 *(preprint)* [DOI]

Collaborative Publications

2. Dam B, **Ajnabi J**, Saha T, Shrivastava A, Badarinath K, Hegde A, Dutta A, Jasoria S, Kataria S, Singh A, Jamora C. *Mindin-mediated αM-integrin endocytosis activates STAT3 to maintain keratinocyte stemness.* **Cell Communication and Signaling**, 2026 [DOI]
3. Dutta A, Gupta D, **Ajnabi J**, Dam B, P S, Jamora C. *Spatial transcriptomic analysis of the immune landscape following NB-UVB treatment of vitiligo skin.* **Clinical & Translational Immunology**, 2026 [DOI]
4. Dutta S, Islam Z, Das S, Barman A, Chowdhury M, Mondal BP, **Ajnabi J**, Manna D. *Harmonizing plant resilience: membrane lipid dynamics in response to abiotic stresses.* **Discover Plants**, 2025 (review)
5. Bhatt T, Dam B, Khedkar SU, Lall S, Pandey S, Kataria S, **Ajnabi J**, Gulzar SEJ, Dias PM, Waskar M, Raut J, Sundaramurthy V, Vemula PK, Ghatlia N, Majumdar A, Jamora C. *Niacinamide enhances cathelicidin-mediated SARS-CoV-2 membrane disruption.* **Frontiers in Immunology**, 2023 [DOI]
6. Rana I, Kataria S, Tan TL, Hajam EY, Kashyap DK, Saha D, **Ajnabi J**, Paul S, Jayappa S, Ananthan ASHP, Kumar P, Zaarour RF, Haarshaadri J, Kansagara G, Rizvi A, Zirmire RK, Badarinath K, Khedkar SU, Chandra Y, Samuel R, George R, Danda D, Jacob PM, Dey R, Dhandapany PS, He YW, Varga J, Varghese S, Jamora C. *Mindin (SPON2) is essential for cutaneous fibrogenesis in a mouse model of systemic sclerosis.* **Journal of Investigative Dermatology**, 2023 [DOI]
7. Badarinath K, Dam B, Kataria S, Zirmire RK, Dey R, Kansagara G, **Ajnabi J**, Hegde A, Singh R, Masudi T, Sambath J, Sachithanandan SP, Kumar P, Gulyani A, He YW, Krishna S, Jamora C. *Snail maintains the stem/progenitor state of skin epithelial cells and carcinomas through autocrine Mindin signaling.* **Cell Reports**, 2022 [DOI]

Fellowships and Awards

- **Paeonia Foundation Travel Award** – selected to present at *Mechanobiology in Health and Disease Conference*, National University of Singapore, 2023
- **CSIR-NET Junior Research Fellowship (JRF)**, All India Rank 20 – national PhD fellowship, Council of Scientific and Industrial Research, 2019
- **ICMR Junior Research Fellowship (JRF)**, Life Sciences – Indian Council of Medical Research, 2019
- Also qualified: ASRB-NET (Agricultural Biotechnology, 2020), GATE XL (All India Rank 8, 2019), DBT-BCIL Fellowship (2019), ICAR AICE-JRF/SRF (All India Rank 3, 2019), and ICAR AIEEA-PG (All India Rank 1, 2017)

Selected Presentations

- **Talk** – "Mechanical control of an epigenetic switch: Mechanoregulation of DNMT3a during wound healing" at *ICMMB 2026: International Conference on Mechanics in Medicine and Biology*, Academia, SGH Campus, Singapore, October 2026
- **Poster** – "Mechanoregulation of DNMT3a in the cutaneous wound healing response" at *Mechanobiology in Translational Research: Bioforces to Bedside*, Department of Bioengineering, Indian Institute of Science (IISc), Bengaluru, India, 2025
- **Poster** – "Epigenetic and mechanical regulation of the cutaneous wound healing response" at *Mechanobiology in Health and Disease Conference*, National University of Singapore, Singapore, 2023
- **Poster** – "Role of DNMT3a in the cutaneous wound healing response using a mouse model" at the *10th International Conference of Laboratory Animal Scientists' Association (LASA)*, Hyderabad, India, 2022
- **Poster** – "Identification and characterization of stress-responsive PM19 promoter from wheat" at *National Agricultural Science Congress,* New Delhi, India, 2019

Technical Expertise

Experimental Biology

- Primary epidermal keratinocyte culture, mouse models, and colony management
- Quantitative live-cell and fluorescence microscopy (confocal and multiphoton), tissue imaging, and flow cytometry (FACS)
- Molecular and cellular biology: genetic perturbation, transfection, qPCR, Western blotting, pseudovirus generation and assays, BSL-2 workflows

Computational & Analytical

- GraphPad Prism, Adobe Illustrator, MATLAB, R, and Python (data analysis and plotting)
- Image analysis (FIJI/ImageJ, CellSense)
- Web development (HTML/CSS/JavaScript) – built and maintain a personal academic website (johanajnabi.com)

Mentoring & Collaboration

- Mentored five junior researchers in primary cell culture, molecular biology techniques, and experimental design, including training in data interpretation and scientific communication (presentations and writing)
- Collaborated across interdisciplinary projects spanning mechanobiology, immunology, and spatial transcriptomics, integrating experimental and clinical datasets
- Contributed to six multi-author studies across epithelial biology, fibrosis, and host–pathogen interactions, supporting experimental design, data generation, and analysis

Academic and Community Service

- Peer Reviewer, Frontiers in Physiology (October 2026)
- Volunteer, COVID-19 diagnostic testing, Bangalore Life Science Cluster (BLiSC), 2020–2021

Languages

- Bengali (Native)
- English (Advanced)
- Hindi (Limited working proficiency)

References

Prof. Colin Jamora
Senior Professor
Department of Life Sciences, Shiv Nadar Institution of Eminence Deemed to be University, Gautam Buddha Nagar, Tehsil Dadri, Uttar Pradesh – 201314, India
Email: colin.jamora@snu.edu.in

Prof. Dasaradhi Palakodeti
Professor
BRIC-Institute for Stem Cell Science and Regenerative Medicine (inStem),
GKVK Post, Bellary Road, Bengaluru, Karnataka – 560065, India
Email: dasaradhip@instem.res.in