Bhupesh Kumar Prusty PhD



Host-pathogen interactions, Chlamydia biology and small non-coding RNA regulation

Main supervisor | Host-Pathogen Interactions Group

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Current position	Tenured Professor
Organisational unit	Institute of Microbiology and Virology, Host-Pathogen Interactions Group
KEY-RSU role	Main supervisor
Thematic area	MVI-1 Chlamydia-Induced Telomere Damage and Repair Mechanisms; MVI-2 miRNA-miRNA Regulatory Networks in Immune Regulation and Viral Pathogenesis

Host environment

The Institute of Microbiology and Virology (MVI), a structural unit of the Research Centre at Riga Stradiņš University, provides a multidisciplinary and internationally oriented research environment in medical microbiology, virology, molecular biology, clinical immunology, and biotechnology. MVI brings together several research groups with complementary expertise, fostering collaboration across fundamental and translational biomedical research. The Host-Pathogen Interactions Group offers particular strengths in viral latency, chronic post-viral diseases, innate immunity, mitochondrial biology, and small non-coding RNAs, providing an excellent environment for advanced training and interdisciplinary research.

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Supervisor Overview

Bhupesh Kumar Prusty is a Tenured Professor at the RSU Institute of Microbiology and Virology and a main supervisor in KEY-RSU. He will supervise research within two programme themes: MVI-1 Chlamydia-induced telomere damage and repair mechanisms, and MVI-2 miRNA-miRNA regulatory networks in immune regulation and viral pathogenesis.

Research Expertise

His expertise spans host-pathogen interactions, Chlamydia biology, viral latency and reactivation, innate immunity, mitochondrial biology and small non-coding RNA regulation. His group studies how intracellular pathogens remodel host-cell functions and connects mechanistic work with wider questions in infection-associated immune dysfunction and chronic post-viral disease. Methodological strengths include molecular and cellular microbiology, infection models, RNA-focused assays, advanced imaging, transcriptomics, functional perturbation, and systems-level analysis. This combination supports interdisciplinary work across virology, bacteriology, immunology, RNA biology and computational research.

Research Opportunities

Current opportunities centre on how intracellular pathogens, particularly Chlamydia, reprogramme host-cell functions through small non-coding RNAs and related regulatory networks. Emerging questions include

pathogen-induced effects on telomere remodelling and repair, mitochondrial dynamics, innate immunity, cellular metabolism and persistence, as well as complex miRNA–miRNA crosstalk shaping immune responses and viral pathogenesis.

Preliminary observations provide a strong starting point for postdoctoral researchers to formulate original and independently driven research questions, rather than simply implement a predefined work package. Complementary expertise in RNA biology, CRISPR-based perturbation, advanced imaging, transcriptomics, single-cell methods, computational biology or systems analysis could open new directions. Relevant opportunities include established infection models, molecular and cellular microbiology platforms, RNA-focused assays, imaging, single-cell RNA sequencing, 3D tissue models and omics datasets, subject to the final project design, capacity and applicable approvals.

Research Environment and Collaboration

The postdoctoral researcher will join the scientific life of the Prusty Lab through one-to-one supervision, weekly lab discussions, journal clubs and project meetings. They will be encouraged to contribute across projects, co-supervise junior researchers and lead defined experimental or analytical work packages.

International connections include the COST Action CINNAMON and collaboration with the ZINF Research Center for Infectious Diseases and the Helmholtz Institute for RNA-based Infection Research in Germany. Potential activities include joint meetings, scientifically justified research visits, consortium participation, collaborative publications and engagement with clinical and computational partners. Participation will depend on scientific fit, project timelines and applicable arrangements.

Supervision and Researcher Development

Supervision begins with regular one-to-one meetings to refine the research question, strategy, milestones and risk-mitigation plan. Guidance becomes progressively less directive as the postdoctoral researcher develops ownership of the project. Feedback is intended to be timely, specific, and evidence-based, with major scientific decisions discussed openly. The postdoctoral researcher will be integrated into group discussions and collaborations while retaining appropriate intellectual independence. As the fellowship progresses, supervision will shift towards strategic mentoring so that the postdoctoral researcher develops independent ideas, collaborations, preliminary data and a competitive profile for future fellowships or research-leadership positions.

Career Development Support

Career development will be integrated into the research programme. The postdoctoral researcher will be supported in defining an independent scientific niche, planning and leading manuscripts, designing projects, managing milestones and presenting work internationally. Opportunities to lead defined activities and supervise junior researchers can provide practical leadership, teaching and team-development experience.

Grant development will be encouraged as the research direction matures, alongside conference participation and introductions to international collaborators. The wider KEY-RSU programme will also support relevant competencies in Open Science, research data management and responsible research practice. The intended outcome is a postdoctoral researcher able to formulate, fund and lead an independent research agenda.

Who May Particularly Thrive in This Environment

This environment may particularly suit a scientifically ambitious and intellectually curious postdoctoral researcher who is ready to take increasing ownership of their work. A strong fit would be someone who enjoys interdisciplinary problem-solving, contributes actively to group discussions and collaboration, and is willing to learn methods beyond their existing expertise. Experience in microbiology, RNA biology, cell biology, imaging, omics or computational analysis would be valuable, but openness to methodological expansion is equally important. These features describe potential fit and do not create additional eligibility requirements.

Selected Contributions

Selective inhibition of miRNA processing by a herpesvirus-encoded miRNA

Hennig T et al., including Prusty BK. Nature 605, 539–544 (2022). DOI 10.1038/s41586-022-04667-4. Contribution: co-author in the work identifying selective viral inhibition of miRNA processing. KEY-RSU relevance: directly informs the miRNA regulatory-networks theme.

Chlamydia trachomatis paralyzes neutrophils to evade the host innate immune response

Rajeeve K et al., including Prusty BK. Nature Microbiology 3, 824–835 (2018). DOI 10.1038/s41564-018-0182-y. Contribution: co-author in mechanistic host–pathogen research. KEY-RSU relevance: supports investigation of immune regulation in Chlamydia infection.

Chlamydia preserves the mitochondrial network through microRNA-dependent inhibition of fission

Chowdhury S et al., including Prusty BK. Journal of Cell Biology 216, 1071–1089 (2017). DOI 10.1083/jcb.201608063. Contribution: co-author in research linking Chlamydia, miRNA regulation and mitochondrial dynamics. KEY-RSU relevance: bridges both proposed MVI research directions.

Supervisory Availability

Bhupesh Kumar Prusty expects to remain available for regular scientific supervision throughout the anticipated five-year KEY-RSU employment period, subject to final project and employment arrangements. This assumes active integration of the researcher and project into the wider scientific programme of the laboratory. Complementary co-supervision will be provided by Dr. Zaiga Nora-Krūkle, director of MVI, who will support the postdoctoral researcher's integration into the Institute and monitor the implementation of their Career Development Plan. Additional expertise may be involved according to the specific needs of the research project.