

**Extracting the secrets of the infected cell:
Multiomic characterization of host responses during infection by Zika and
Dengue virus**

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1:30PM-2:50PM

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Abstract:

Viruses hijack cellular systems to promote replication, remodeling host cells across molecular layers in a temporal cascade. A comprehensive understanding of these responses reveals pathogen-cell interactions and potential intervention strategies.

We profiled macromolecular remodeling in A549 cells infected with dengue or zika virus, two medically relevant pathogens, by integrating RNA, protein, and lipid measurements across a high-resolution time course from 3 to 36 hours post-infection. The dataset spans over 30,000 features across 90 samples, covering the full viral replication cycle and enabling direct cross-modality and cross-virus comparison.

Infection drives rapid, dramatic transcriptome remodeling, while the proteome and lipidome are remodeled on distinct, slower timescales. The signals most relevant to infection outcome emerge from coordinated relationships across modalities rather than any single one, transcriptome remodeling drives proteome remodeling, and lipidome changes reflect the direct metabolic demands of viral replication. We developed an AI-guided pipeline combining cross-modal correlation, pathway analysis, and literature synthesis to extract testable mechanistic hypotheses from this high-dimensional data, all accessible through an open Infectomics Dashboard we will release later this year.

Bulk measurements, however, average across heterogeneous cell states present in the population during infection. Single-cell RNA sequencing at select time points resolved this mixture into four functionally distinct subpopulations: uninfected cells, productively infected cells, uninfected bystander cells responding to viral exposure, and hyper-responder cells with elevated immune and stress signatures. Together, these data provide a comprehensive molecular atlas of flavivirus-infected cells to date.

Reading List:

1. [RNA/Proteomics comparison in Vaccinia virus infection](#)
2. [MEFISTO, a method of modeling changes in cell state over time](#)