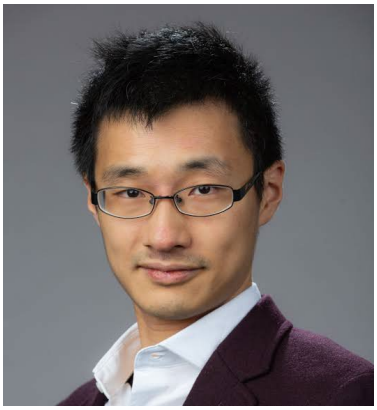
Leading Scientist Seminar

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#32 Main Campus



Viral RNA methylations: how they enhance RNA functions of Hepatitis B and Influenza A viruses

Abstract

Viral RNAs were long known to be modified with methylations, yet the extent and function of these viral RNA methylations remained elusive until the recent decade. In particular, methylations added onto cytidines (5-methylcyditine, m^5C) were found to enhance HIV-1 mRNA translation, while methylated adenosines (N^6-methyladenosine, m^6A) ensure HIV-1 RNA stability. As RNA methylations seem to enhance the replication of most viruses studied to date, we hypothesized that most viruses evolved to enrich for RNA modifications that are beneficial for viral replication. Extending this hypothesis to Hepatitis B virus (HBV) and Influenza A virus (IAV), we deployed the latest modification detection methods to elucidate the modification landscape of HBV and IAV, as well as how they regulate viral RNA. We have found the RNA of HBV to be extensively modified, with m^5C enhancing viral genome packaging and translation; while single molecule analysis of Nanopore direct RNA-seq reveals m^6A protecting HBV viral RNA poly(A) tails and RNA stability. For Influenza, we found m^6A to be mostly restricted to viral mRNAs but not genomic RNAs, with viral mRNAs also stabilized by m^6A. Our work demonstrates that multiple human-infecting pathogenic viruses exploit cellular RNA modification machinery for their benefit and that modification machinery represent host factors that may be targeted for broad spectrum antiviral development.

Reference

Su et al., 2024, PNAS 121(24):e2400378121, PMID 38830096
Su et al., 2025, bioRxiv, doi: 10.1101/2025.04.08.647702
Wu et al., 2026, bioRxiv, doi: 10.64898/2026.09.01.748482, PMID 42922530

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