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Poster #31: tRNA epitranscriptome plasticity optimizes phage infection in E. coli

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The epitranscriptome is the collection of all chemical modifications in RNA molecules. Changes in the epitranscriptome alter the structure and functionality of RNAs, and thereby influence biological processes. The contribution of epitranscriptomic regulation to host–virus interactions in prokaryotes is poorly understood. To shed light on these effects, we performed time-resolved dual profiling of host and viral tRNA expression and modification patterns in an *Escherichia coli*–T5 phage infection model. Using direct RNA sequencing, proteomics, and mass spectrometry, we comprehensively analyzed the changes on tRNA and rRNA modifications and their relation with protein synthesis. Phage infection induced changes in host tRNA modifications. These modifications support optimal particle production and replication time. In parallel, viral tRNAs and tRNA-like structures are expressed and modified throughout infection. We observe that viral tRNA while having different modifications pattern from their cognate host tRNAs, substitute or complement the host tRNAs during infection and, together with their epitranscriptomic signature, support the protein synthesis requirements during the late stage of phage production. These findings reveal that the overall tRNA pool is adjusted at both the abundance and epitranscriptomic levels to optimize translation, highlighting RNA-based regulation and its modification as an additional layer of phage-host adaptation.

Reference #1

Reference #2

Reference #3

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