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Modeling the influenza virus infection in a host: consideration of semi-infectious particles

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Influenza is an RNA virus with a genome comprised of eight gene segments. Recent experiments show that the vast majority of virions lack one or more gene segments and thus cannot cause a productive infection on their own. These particles, called semi-infectious particles (SIPs), can induce virion production when multiple SIPs are present in an infected cell. Previous within-host influenza models ignored SIPs contributions to virus production. We construct a new influenza model that includes SIPs and multiple infection events. Using in-vivo data, we show that the expanded model fits the data well and SIPs may contribute substantially to the viral load. The ability to describe data with a model that is more biologically motivated is an important step toward better understanding influenza infection dynamics.

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