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Modeling within-host and aerosol dynamics of SARS-CoV-2: the relationship with infectiousness

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Modeling within-host and aerosol dynamics of SARS-CoV-2: the relationship with infectiousness

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The relationship between transmission of severe acute respiratory syndrome coronavirus 2 (SARSCoV-2) and the amount of virus present in the proximity of a susceptible host is not understood. Here, we developed a within-host and aerosol mathematical model and used it to determine the relationship between viral kinetics in the upper respiratory track, viral kinetics in the aerosols, and new transmissions in golden hamsters challenged with SARS-CoV-2. We determined that infectious virus shedding early in infection correlates with transmission events, shedding of infectious virus diminishes late in the infection, and high viral RNA levels late in the infection is a poor indicator of transmission. We further showed that viral infectiousness increases in a density dependent manner with viral RNA and that their relative ratio is time-dependent. Such information is useful for designing interventions.