Coinfection of influenza A and B and human OC43 coronavirus in normal human bronchial epithelial cells

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Abstract

Background Influenza viruses and seasonal coronaviruses are pathogens transmitted via an airborne route that can cause respiratory diseases in humans that have similar symptoms such as fever, cough, and pneumonia. These two viruses can infect similar human tissues, such as the respiratory tract and nasal, bronchial, and alveolar epithelial cells. Influenza virus and seasonal coronavirus coinfections are poorly understood. METHODS Here, we coinfected normal human bronchial epithelial (NHBE) cells with influenza A/California/04/09 (IAV) or B/Victoria/504/2000 (IBV) strains and the seasonal human beta-coronavirus OC43 and evaluated viral replication capacities. We also examined changes in the expression of various cytokines/chemokines by qPCR and Luminex assay. RESULTS We observed that replication of IAV and IBV was not affected by coinfection with OC43. However, coinfection reduced OC43 titers (~3-fold) compared to infection with OC43 alone. Select cytokine/chemokine expression was increased in coinfected cells compared to all single infections with greater differences seen between coinfected cells and cells infected with OC43 alone compared to IAV- or IBV-infected cells. In addition, IL-8 and IL-1RA showed the highest expression among a panel of 22 cytokines by Luminex. Conclusions As the rate of influenza and seasonal coronavirus coinfection continue to increase, our findings may help set guidelines for the treatments of the individuals coinfected with both viruses.
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Thank you for your consideration of this manuscript.

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Figure 2

A

IFNβ1

IL-6

CXCL10

Relative expression

Time of DC43 addition

B

IFNβ1

IL-6

CXCL10

Relative expression

Time of DC43 addition

C

IFNβ1

IL-6

CXCL10

Relative expression

Time of UV addition

D

IFNβ1

IL-6

CXCL10

Relative expression

Time of BV addition