Abstract

Characterising Interactions between Influenza A Virus and Respiratory Syncytial Virus during *In Vitro* Coinfection[†]

Joanne Haney *, Kieran Dee, Colin Loney, Swetha Vijayakrishnan and Pablo R. Murcia

MRC-University of Glasgow Centre for Virus Research, Glasgow G61 1QH, UK;

kieran.dee@glasgow.ac.uk (K.D.); colin.loney@glasgow.ac.uk (C.L.);

swetha.vijayakrishnan@glasgow.ac.uk (S.V.); pablo.murcia@glasgow.ac.uk (P.R.M.)

* Correspondence: j.haney.1@research.gla.ac.uk

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Abstract: Influenza A virus (IAV) and respiratory syncytial virus (RSV) are important respiratory pathogens that share common epidemiological features and cellular tropism within the respiratory tract. This gives rise to the potential for biological interactions between IAV and RSV during coinfection of hosts. Virus–virus interactions are increasingly recognised for their contribution to viral dynamics during infection, however, the molecular processes underpinning these interactions are unknown. Here, we developed an *in vitro* coinfection system to characterise the infection dynamics of IAV (A/Puerto Rico/8/34, H1N1) and RSV (A2) in single virus infection or coinfection in lung epithelial cells, with the aim to identify biological processes that drive virus–virus interactions during coinfection. We compared viral replication kinetics at different multiplicities of infection and observed that RSV replication was inhibited during coinfection with IAV, whilst IAV replication was facilitated by coinfection. To further characterise IAV/RSV interactions, we determined the relative proportions of single virus infected or coinfecting cells during early and late timepoints post-infection and observed differences in expression of viral proteins between single and coinfecting states. Additionally, cell viability was measured to determine differences in viral-induced cytopathic effect. Compared with RSV infection, cell death is induced at earlier timepoints post IAV infection and coinfection, indicating that different cellular processes are initiated in response to infection. These studies highlight that both competitive and facilitative ecological interactions occur between IAV and RSV during coinfection and shed light on sources of potential interactions at the cellular and molecular level.

Keywords: coinfection; influenza A virus; respiratory syncytial virus; virus–virus interactions

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