Visualization of bacto-viral coinfection in fully differentiated respiratory epithelial cells cultured at the air-liquid interface

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Coinfection events represent an issue of global health as primary virus infections often pave the way for bacterial superinfections, frequently leading to an exacerbation of disease prognosis. For respiratory pathogens, the primary barrier to overcome is the respiratory epithelium. It constitutes a complex polarized tissue and comprises basal cells, mucus-secreting goblet cells, and ciliated cells. The combination of the last two is responsible for the upper airway's self-cleaning mechanism, referred to as mucociliary clearance. Commonly used immortalized epithelial cell culture systems for respiratory infections only form two-dimensional cell monolayers and are unable to differentiate into the different subsets of cells present in the respiratory epithelium. Consequently, these systems insufficiently reflect the in vivo situation. However, by culturing primary bronchial epithelial cells at the air-liquid interface, it is possible to generate a polarized and fully differentiated respiratory epithelium with in vivo-like properties. Here, we employ these well-differentiated epithelial cell cultures derived from porcine lung tissue to assess bacto-viral coinfection of swine influenza virus and pneumonia-causing bacteria. Using high-resolution microscopy, we aim to analyze the maintenance of the epithelial barrier function, the cell tropism and infection dynamics of the pathogens, as well as both the host-pathogen- and the pathogen-pathogen interactions.

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