

ANA 202 ASSIGNMENT

Human coronaviruses (HCoVs) are large RNA viruses that infect the human respiratory tract. The emergence of both Severe Acute Respiratory Syndrome and Middle East Respiratory syndrome CoVs as well as the yearly circulation of four common CoVs highlights the importance of elucidating the different mechanisms employed by these viruses to evade the host immune response, determine their tropism and identify antiviral compounds. Various animal models have been established to investigate HCoV infection, including mice and non-human primates. To establish a link between the research conducted in animal models and humans, an organotypic human airway culture system, that recapitulates the human airway epithelium, has been developed. Currently, different cell culture systems are available to recapitulate the human airways, including the Air-Liquid Interface (ALI) human airway epithelium (HAE) model. Tracheobronchial HAE cultures recapitulate the primary entry point of human respiratory viruses while the

alveolar model allows for elucidation of mechanisms involved in viral infection and pathogenesis in the alveoli. These organotypic human airway cultures represent a universal platform to study respiratory virus-host interaction by offering more detailed insights compared to cell lines. Additionally, the epidemic potential of this virus family highlights the need for both vaccines and antivirals. No commercial vaccine is available but various effective antivirals have been identified, some with potential for human treatment. These morphological airway cultures are also well suited for the identification of antivirals, evaluation of compound toxicity and viral inhibition.

Background

Respiratory diseases caused by human coronavirus infection are of both medical and socio-economic importance. Currently, they are studied in various model systems, ranging from cell lines to animal models. Originally, the importance of HCoVs in the burden of human disease was underestimated and as a result, no general therapy exists to treat

coronavirus induced disease in humans. Furthermore, no commercial vaccine is available leaving the human population vulnerable to emerging coronavirus infections. Both the Severe Acute Respiratory Syndrome and Middle East Respiratory Syndrome coronaviruses have recently crossed the species barrier and entered the human population to cause severe disease. In this review, we summarize the current knowledge on human coronavirus infection emphasizing the usefulness of organotypic human airway cultures as a model system.