

Impact of insert brand on epithelial cell types and ciliary activity in human respiratory air-liquid interface cell cultures

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Abstract

Cultures of primary human nasal epithelial cells (hNECs) differentiated at the air-liquid interface (ALI) represent a sophisticated and widely used model of the human upper respiratory epithelium. Despite the availability of various cell culture insert types and the well-established understanding that different culture media influence the cell culture characteristics, the possible impact of the insert type remains rather underexplored. We compared hNECs ALI cultures from nineteen healthy adult non-smoking donors grown on three distinct brands of commercially available inserts - Corning® Transwell®, CELLTREAT® and ThinCert® with regards to cellular composition and ciliary activity of the cultures using flow cytometry and high-speed video microscopy. Additionally, we employed an alternative method of hNECs culture setup – the inverted condition, wherein the hNECs were seeded on the basal side of the insert. This setup was tested with the idea to avoid the mucus accumulation. Our results show that ciliary activity and cell type composition did not differ between insert types for both culture conditions. However, we found a higher ciliary beat frequency and a lower active area in the inverted compared to the conventional setup across all three insert brands. These findings indicate that all three mentioned insert types yield comparable cell cultures.