

Cytokine-Induced Goblet Cell Hyperplasia in the (EpiAirway-FT) In Vitro Full-Thickness Human Airway Model.

P.J. Hayden, PhD¹, G.R. Jackson, BS¹, J.L. Bolmarcich, BS¹, G. Stolper, MD¹, E. Spiller, BS¹ and M. Klausner, MS¹. ¹MatTek Corporation, Ashland, MA, United States.

RATIONALE: In vitro models of airway epithelium (AE) have potential utility for study of diseases such as asthma and COPD. However, interaction of AE with fibroblasts (FB) residing in subepithelial stromal tissue is an important aspect of many airway diseases. To allow in vitro study of airway phenomena that may involve epithelial/matrix interactions and airway remodeling, the current poster describes development of a highly differentiated full thickness human airway model composed of FB-containing collagen matrix and AE cells.

METHODS: Normal human pulmonary FB were cultured within a collagen matrix. Normal human tracheal/bronchial epithelial cells were then cultured above the matrix. The tissue constructs were induced to differentiate to an in vivo-like mucociliary phenotype by raising to the air/liquid interface. The response of the full-thickness airway model to treatment with cytokines including IL-4 and IL-13 was also examined.

RESULTS: Histologic examination of the AE equivalent shows a collagen matrix populated by numerous viable FB and a pseudostratified epithelium with mucociliary morphology typical of in vivo airway epithelium. Ciliated cells predominated in control cultures with numerous goblet cells also evident. Treatment of the model with inflammatory cytokines induced a remarkable increase in both the size and number of goblet cells within the epithelium.

CONCLUSIONS: EpiAirway-FT overcomes shortcomings of previous models in terms of providing epithelial cell/FB/matrix interactions as well as appropriate in vivo-like morphology. Treatment of the model with inflammatory cytokines effectively reproduced goblet cell hyperplasia in the human AE/FB co-culture model. The model will enable more realistic in vitro studies of airway epithelium phenomena.

Funded By: NIH

Poster Board: B33

Viewing Date/Time: Tuesday, May 22, 8:15AM-12:15PM

Location: Area B (Hall D, Lower Level), Moscone Center