Mucin secretion stimulated by IL-13 or poly I:C in differentiated upper compared with lower airway epithelial cells in culture.

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Background

IL-13 stimulates normal human bronchial epithelial (NHBE) cells to produce MUC5AC and MUC5B; the principal airway gel-forming mucins. Less is known about the secretory response of nasal cells. The nose is exposed to the outside environment and protects the lower airways, so we hypothesized that stimulated mucus secretion in upper airways would be greater than in lower airways.

Objectives

We evaluated the difference between normal human nasal epithelial (NHNE) and NHBE cells in mucin secretion and cell morphology with exposure to IL-13 or Poly inosinic-cytidyric acid (polyI:C).

Methods

Cell culture

NHBE and NHNE cells were differentiated at an air-liquid interface with IL-13 or PBS for 14 days. For polyI:C exposure, cells were exposed to Poly I:C on day 13 of ALI and supernatants were collected on day 14.

MUC5AC and MUC5B secretion

MUC5AC and MUC5B secretion were measured by ELISA.

Histology

Cells were stained using H&E, PAS, and MUC5AC or MUC5B antibody to examine cell morphology.

Results

Figure1. Mucin secretion was greater in NHBE cells than in NHNE cells with IL-13 stimulation.

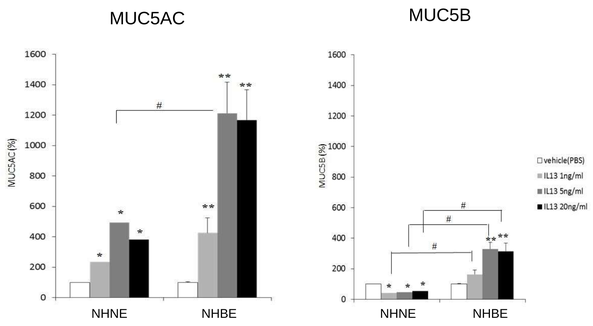
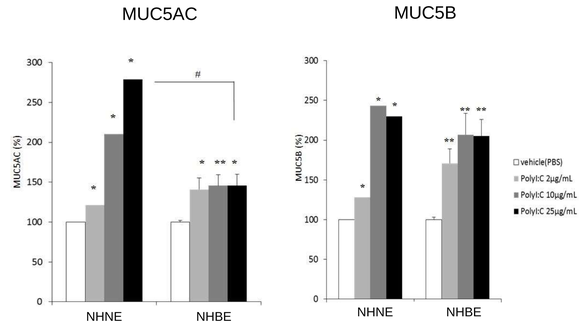
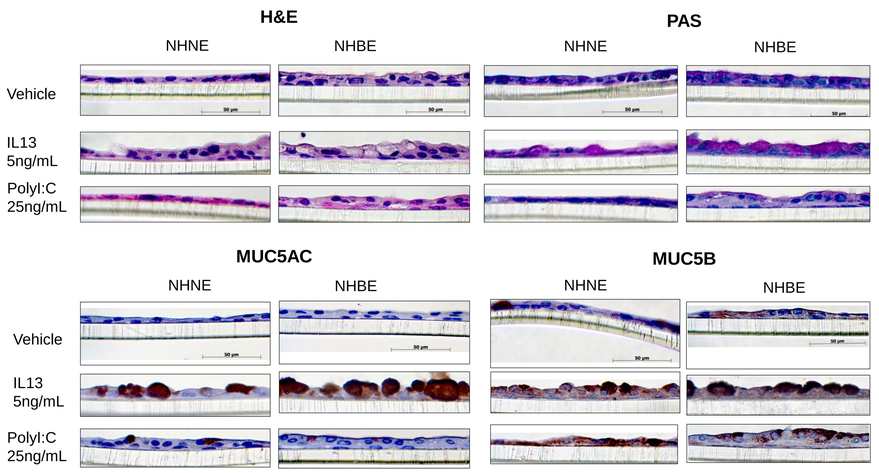


Figure2. MUC5AC secretion was greater in NHNE cells than in NHBE cells with Poly I:C stimulation.



(Data are shown as means±SEM. N=3 for NHBE cells, N=1 for NHNE cells.
*P<0.05, **P<0.001 compared to IL-13 or polyI:C vehicle (PBS). #P<0.05.)

Figure 3. Immunohistochemistry results were consistent with ELISA results.



Discussion

IL-13 increased MUC5AC and MUC5B secretion in NHBE cells and this was greater than in NHNE cells. (Figure 1)

MUC5AC secretion in polyI:C exposed NHNE cells was greater than in NHBE cells, while there was no difference in MUC5B secretion in NHNE and NHBE cells exposed to polyI:C. (Figure 2)

Immunohistochemistry of the airway cultures was consistent with the ELISA protein results (Figure 3)

Although these are preliminary data using different donors, this suggests an enhanced protective effect of nasal mucus secretion with virus challenge.

References

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