# Periostin Modulates Mucin Production in Airway Epithelial Cells

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## Background

Periostin, a 90-kDa member of the fasciclin-containing family, is increased in asthma. Airway epithelial cells express periostin mRNA when exposed to IL-4 or IL-13, but data regarding periostin protein production is limited, and periostin effect on the airway epithelium is unclear. We hypothesized that periostin is produced in airway epithelial cells and it influences mucin secretion.

## Objectives

In differentiated normal human bronchial epithelial (NHBE) cells:

1. Evaluate IL- 13 induced periostin secretion and its STAT6 signal pathway.
2. Investigate the effect of periostin on MUC5AC and MUC5B secretion.

## Methods

**Cell culture**

NHBE cells were grown for 14 days at air-liquid interface (ALI) with or without IL-13 to produce a goblet cell or ciliated cell phenotype. Experimental conditions are shown in figure 1.

For periostin exposure, ciliated cells were cultured with PBS vehicle or recombinant human (rh)-periostin for the full 14 days or for 1 day after full differentiation at ALI.

**Periostin, MUC5AC and MUC5B secretion**

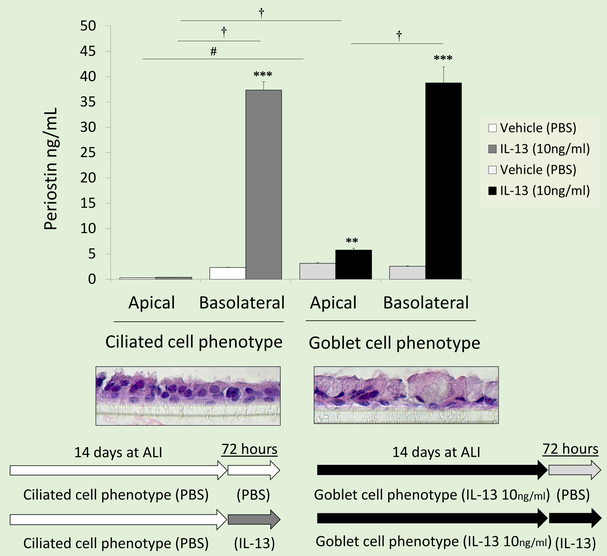
Periostin in apical and basolateral medium, and MUC5AC and MUC5B in apical medium was measured.

**Histology**

H&E stain was used to evaluate changes in cell morphology after 14 days rh-periostin exposure.

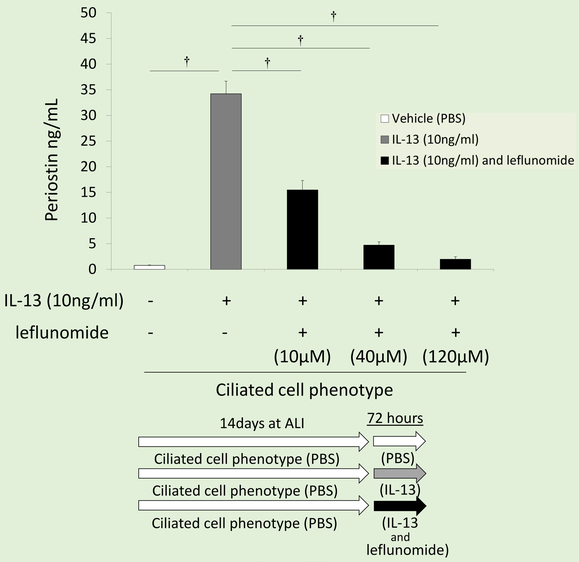
## Results

Figure 1. IL-13 induced periostin secretion from both ciliated and goblet cells.



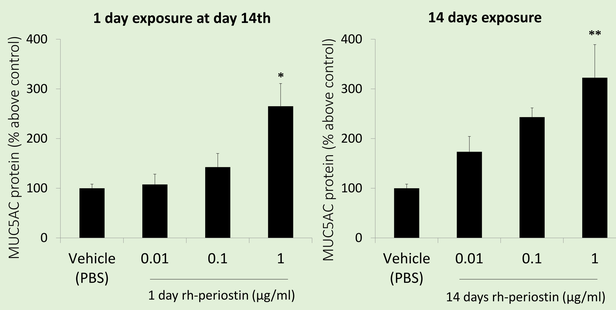

(**P < 0.01, ***P<0.001 compared to each PBS, †P<0.001, #P<0.01, N=4)

Figure 2. Leflunomide (STAT6 inhibitor) attenuated IL-13 induced periostin secretion from ciliated cell phenotype.



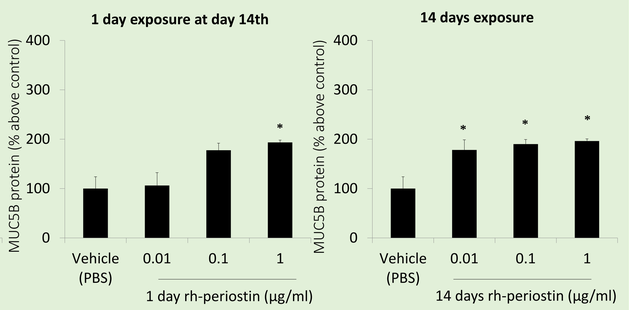

(†P <0.001, N=4)

Figure 3. rh-periostin increased MUC5AC secretion.



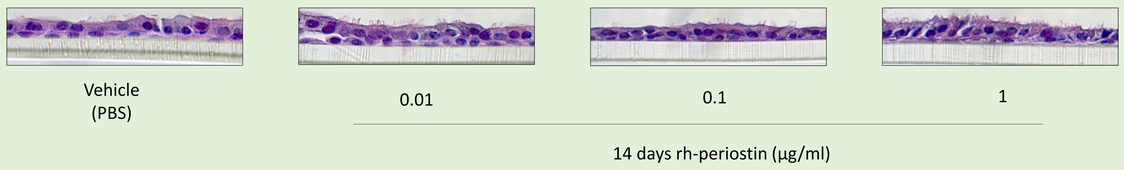

( N=4, **P<0.01, *P < 0.05 compared to PBS)

Figure 4. rh-periostin modestly increased MUC5B secretion.




( N=4, *P < 0.05 compared to PBS)

Figure 5 . rh-periostin did not change differentiated cell morphology.




## Discussion

Periostin secretion from human airway epithelial cells was increased by IL-13 via the STAT6 pathway. MUC5AC and MUC5B production from airway epithelial cells was stimulated by rh-periostin.

IL-13 induced periostin was detected predominantly from the basal side. This suggests that airway epithelial cells can be a source of serum periostin.

Our data showed that rh-periostin modestly promotes mucin secretion from airway epithelial cells even without IL-13 stimulation. It suggests that periostin itself modulates mucin secretion and that IL-13 may induce mucin secretion via periostin.

## Conclusion

Airway epithelium is a source of periostin. IL-13 promotes airway periostin via STAT6. Basal secretion of periostin may influence remodeling.

Additionally, periostin promotes mucin secretion from airway epithelial cells.

## References

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2. Matsumoto H. Serum periostin: a novel biomarker for asthma management. Allergology international : official journal of the Japanese Society of Allergology 2014; 63: 153-160.