

# Commensal Bacteria Contribute To Barrier Integrity But Do Not Affect Rhinovirus Replication In The Nasal Epithelium

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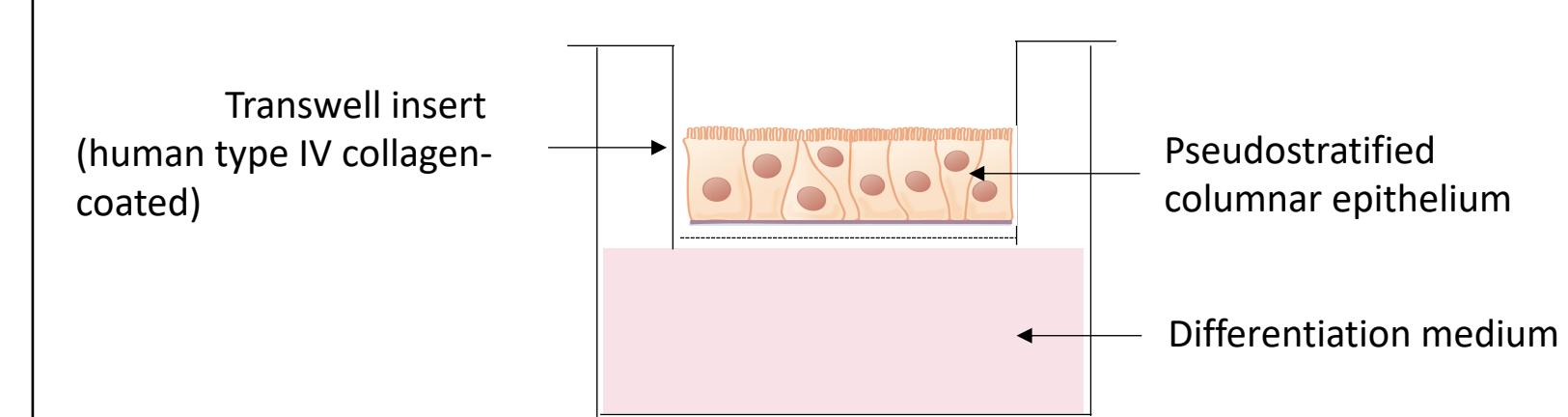
## Rationale

Airway microbial composition in early childhood is a risk factor for the development of asthma in children<sup>1</sup>

## Hypotheses

- Commensal nasal bacteria
- Increase integrity of epithelial barrier
  - Decrease rhinovirus (RV) replication

## Methods



Human bronchial epithelium at air-liquid interface

Inoculation with  $3 \times 10^5$  CFU of bacteria isolated from nasal secretions of children  
*Staphylococcus aureus*, *S. epidermidis*,  
*Corynebacterium propinquum*,  
*C. pseudodiphtheriticum* and *Moraxella catarrhalis*

24 hours

RV A-16  $10^5$  PFU

48 hours

RV replication – qPCR  
Cytotoxicity – LDH assay

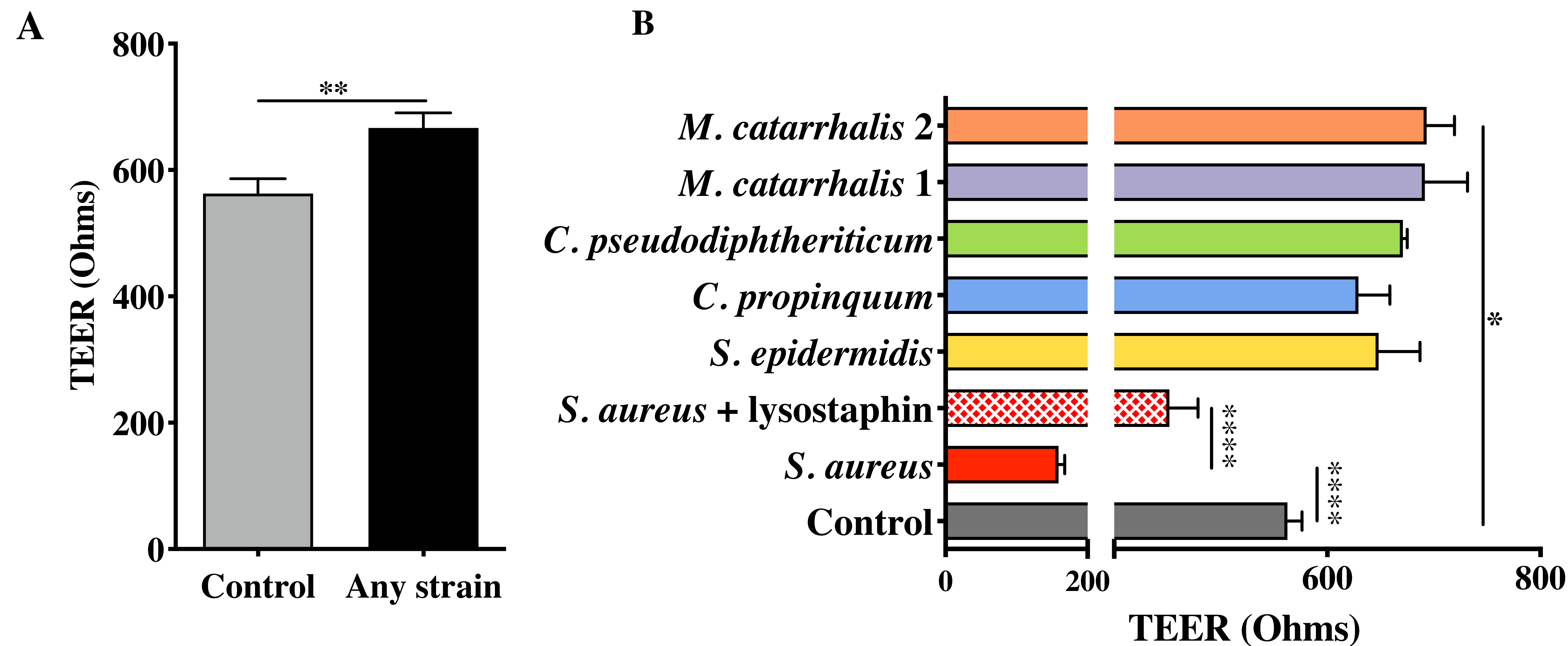
Barrier integrity – Trans-epithelial electrical resistance (TEER)

## References

1. Bashir H, Grindle K, Vrtis R, Vang F, Kang T, Salazar L, et al. Association of rhinovirus species with common cold and asthma symptoms and bacterial pathogens. *J Allergy Clin Immunol* 2018; 141:822-824.

## Results

### Commensal bacteria increase airway epithelial barrier resistance



**Figure 1.** (A) Presence of any commensal strain, except *S. aureus*, significantly increased the TEER by 48 hours ( $P=0.002$ ). (B) One isolate of *M. catarrhalis* significantly increased epithelial barrier resistance ( $P = 0.04$ ) while *S. aureus* caused barrier disruption ( $P < 0.0001$ ). The addition of lysostaphin to the culture medium salvaged the epithelium

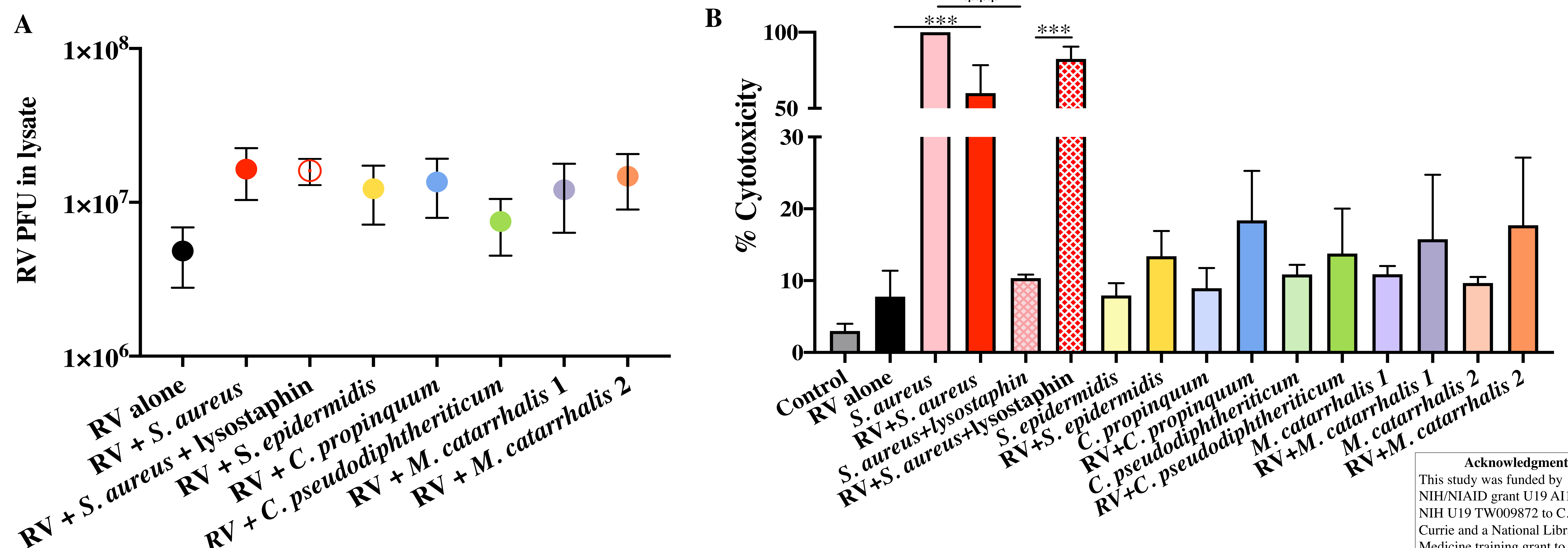
## Conclusions

- Commensal bacteria
- Strengthen barrier integrity by increasing epithelial resistance
    - *S. aureus* decreases barrier resistance
  - Have little or no affect RV replication in vitro
    - RV and *S. aureus* co-infection causes significant cytotoxicity

## Implications

- The microbial composition of the upper airways of children could differentially affect epithelial barrier function in vivo.
- *S. aureus* could increase RV-induced damage to the airway epithelium

### Commensal bacteria have little effect on RV replication, but differentially affect cytotoxicity



**Figure 2.** (A) Commensal bacteria have minimal effect on RV replication. (B) RV and *S. aureus* co-infection caused a significant increase in cytotoxicity (\*\*\*  $P < 0.001$ ; \*\*  $P < 0.01$ )

## Acknowledgments

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