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.

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

Methods
Human bronchial epithelium at air-liquid interface

Inoculation with 3×10^5 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 10^3 PFU
48 hours
RV replication – qPCR
Cytotoxicity – LDH assay

Barrier integrity – Trans-epithelial electrical resistance (TEER)

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.

Results
Commensal bacteria increase airway epithelial barrier resistance

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

Conclusions
Commensal bacteria
- Strengthen barrier integrity by increasing epithelial 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

References

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)

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