Lung microbiome dynamics in COPD exacerbations

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Abstract

Increasing evidence suggests that the lung microbiome plays an important role in chronic obstructive pulmonary disease (COPD) severity. However, the dynamics of the lung microbiome during COPD exacerbations and its potential role in disease aetiology remain poorly understood.

We completed a longitudinal 16S ribosomal RNA survey of the lung microbiome on 476 sputum samples collected from 87 subjects with COPD at four visits defined as stable state, exacerbation, 2 weeks post-therapy and 6 weeks recovery.

Our analysis revealed a dynamic lung microbiota where changes appeared to be associated with exacerbation events and indicative of specific exacerbation phenotypes. Antibiotic and steroid treatments appear to have differential effects on the lung microbiome. We depict a microbial interaction network for the lung microbiome and suggest that perturbation of a few bacterial operational taxonomic units, in particular *Haemophilus* spp., could greatly impact the overall microbial community structure. Furthermore, several serum and sputum biomarkers, in particular sputum interleukin-8, appear to be highly correlated with the structure and diversity of the microbiome.

Our study furthers the understanding of lung microbiome dynamics in COPD patients and highlights its potential as a biomarker, and possibly a target, for future respiratory therapeutics.