

Pioneering microbiome findings shed light on aspiration

September 16 2019, by Jessica Cerretani



Credit: AI-generated image ([disclaimer](#))

When children have respiratory infections, clinicians tend to blame gastroesophageal reflux, based on the assumption that bacteria-laden stomach contents rise into the mouth and are then aspirated. As a result, clinicians often recommend a type of anti-reflux surgery called fundoplication to treat these infections. Yet, despite undergoing this

procedure, many patients don't improve.

A new study by Rachel Rosen, MD, MPH, and her colleagues in the Aerodigestive Center at Boston Children's Hospital and the Massachusetts Institute of Technology sheds more light on this issue. The investigators hypothesized that the interactions between the [lung](#) and gastrointestinal microbiomes were more complex than previously understood and that patients with impaired swallowing—and therefore worse airway protection—may have the greatest degree of microbiome impairment.

Making use of the microbiome

To test this hypothesis, the aerodigestive team obtained bronchoalveolar lavage, gastric, and oropharyngeal samples from 220 children who were seen at Boston Children's for evaluation of chronic cough. These samples then underwent DNA sequencing to determine their microbial makeup, or microbiome. The researchers also compared the microbiome from the lungs, oropharynxes, and stomachs of patients who aspirated based on videofluoroscopic swallow study findings and then looked at the interaction between swallowing abnormalities, reflux, and microbial disturbances.

Groundbreaking findings

The team found that lung, oropharyngeal, and gastric microbiomes overlapped in all patients. However, in children with aspiration, the lung microbiome more closely resembled oropharyngeal rather than gastric microbial communities, which explains why fundoplication is not effective in these patients: The microbial changes in the lung result from aspiration of oropharyngeal bacteria rather than gastric bacteria. In addition, the authors found that there are unique microbial signals in

patients with impaired swallowing, and that these patients can be differentiated from patients with intact swallowing based on their microbiome. These findings also point to the possibility of one day identifying biomarkers for aspiration based on the presence of certain bacteria in both the lungs and the oropharynx.

"These results are exciting because we may be able to use the [microbiome](#) as a [diagnostic tool](#) to diagnose aspiration," says Rosen. "In addition, we need to think beyond [gastroesophageal reflux](#) as a cause of respiratory infections in children with impaired swallowing."

More information: Claire Duvallet et al. Aerodigestive sampling reveals altered microbial exchange between lung, oropharyngeal, and gastric microbiomes in children with impaired swallow function, *PLOS ONE* (2019). [DOI: 10.1371/journal.pone.0216453](https://doi.org/10.1371/journal.pone.0216453)

Provided by Children's Hospital Boston

Citation: Pioneering microbiome findings shed light on aspiration (2019, September 16) retrieved 14 May 2024 from <https://medicalxpress.com/news/2019-09-microbiome-aspiration.html>

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