

The nasal ecosystem, viral infection, and a bacterium that causes pneumonia

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Researchers at LSTM, along with colleagues at the University of Edinburgh and the University Medical Center Utrecht, have looked at the impact of the natural microbial flora or microbiota in the nose and viral co-infection on pneumococcal acquisition in healthy adults.

Streptococcus pneumoniae, or pneumococcus, is the main bacterial pathogen involved in pneumonia, a [respiratory tract infection](#) and major global health problem, accounting for more deaths in children under five than any other [infection](#). In a [paper](#) published today in the journal *Nature Communications* the team, using the unique Experimental Human Pneumococcal Challenge model developed at LSTM, studied the relationship between the microorganisms present in the nose, viral co-infection using live attenuated influenza vaccines (LAIV) and pneumococcal carriage. Using molecular techniques, the team discovered that the equilibrium between the microbes in the nose and the host has an impact on pneumococcal acquisition and density, in particular when combined with a viral co-infection. The microbial flora also appeared to have an effect on replication of the virus itself.

LSTM's Professor Daniela Ferreira, co-senior author on the paper said: "We knew relatively little about the relationship between [viral infections](#) and the microbiota. Our model helped us to establish a link between baseline microbiota and colonisation with the bacteria which causes pneumonia and shows the way that it is apparently altered with the introduction of a viral pathogen."

Utilizing the model developed at LSTM the team were able to test this by safely inoculating live bacteria in combination with a live virus in the form of the readily available nasal vaccine for influenza.

Professor Debby Bogaert, University of Edinburgh, is also co-senior author on the paper. She said: "using this sophisticated human challenge model, we were for the first time able to identify that different constellations of microbes in the nose are associated with more or less inflammation, [viral replication](#) and pneumococcal carriage receptiveness."

Especially, identification of specific microbiota constellations which

appear to control viral and bacterial acquisition, and mediate inflammation and infection, might help the design of new preventive or therapeutic strategies for respiratory infections in the future.

More information: Wouter A. A. de Steenhuijsen Piters et al. Interaction between the nasal microbiota and *S. pneumoniae* in the context of live-attenuated influenza vaccine, *Nature Communications* (2019). [DOI: 10.1038/s41467-019-10814-9](https://doi.org/10.1038/s41467-019-10814-9)

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