

The role of microbiota in asthma

Swiss Institute of Allergy and Asthma, University of Zurich, Davos, Switzerland

Liam O'Mahony

Highly sophisticated cellular and molecular networks need to be constantly coordinated in order to tolerate the presence of a large number and diversity of bacteria present on mucosal surfaces, while protective immune responses to potential pathogens must be maintained and induced on demand. Expression of pattern recognition receptors (PRRs) are one mechanism that allows the immune system to discriminate between commensal and harmful microbes. Inappropriate immune responses to commensal bacterial or other non-damaging antigens is a significant component in several pathologies including asthma.

A number of recent studies suggest that the composition of the microbiota (together with their metabolic activity and products) during early infancy affects the risk of developing childhood asthma. In addition, in genetically similar populations, environmental exposure to varied microbial markers such as LPS impact the development of asthma by influencing the innate immune response. Differences in the microbial populations in the lung in adults has also been linked with the incidence and severity of asthma severity, while microbial production of metabolites, such as histamine, are altered in the gut of adult asthma patients. However, it still remains poorly understood as regards the functional consequences of this microbial and metabolite dysbiosis, particularly in the respiratory tract. Specific patterns of dysbiosis may associate with specific asthma endotypes and indeed may influence the response to treatment such as inhaled corticosteroids.

In addition to bacteria, it is likely that viral, and fungal biomes interact with the human host within the lung in complex ways to influence the development and severity of asthma. We now need to integrate knowledge of the microbiome into a systems biology context of the human host and the entire exposome. Research on the microbiome in asthma will surely further our understanding of this disorder and will lead to novel approaches for prevention and management.



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