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The Nasal Microbiome

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There is intense interest in understanding the contribution of airway microbiota to allergic diseases and asthma, and whether the environment in early life acts as a source of microbial inocula for airway mucosal colonization. Many sources can contribute to the colonization of the respiratory tract of the infant/toddler, including airborne microbes that impact the upper and lower airways during respiration and are then swallowed. House dust and soil also contribute to microbial colonization. Pets can affect the home microbiome (ref 1) and contact with dogs and perhaps cats in early life is associated with lower rates of allergic diseases. (ref 2-4) However, not much is known about the influence of environmental exposures on the establishment of the airway microbiome.

With support from the National Institutes of Health, Rho, Inc., in Chapel Hill NC, is collaborating with the University of California at San Francisco, Johns Hopkins Medical School, Boston University Medical Center, Columbia University Medical School, Washington University in St. Louis, and Second Genome in California to explore the importance of early home exposures in determining allergic diseases and asthma. To this end, beginning in 2005, 660 mothers during their third trimester of pregnancy were enrolled in a longitudinal birth cohort study to monitor the development of their children's allergic disease status. Each of these families had a prior history of allergy that put their children at risk for developing allergies and/or asthma. Extensive data have been collected from these families and homes over the past 10 years, including repeated measures of home allergens and microbial exposures. For a subset of the study population, home dust samples were collected at 3 months of age and nasal lavage samples were collected at 12 months of age. The bacterial 16S rRNA gene from the dust and nasal samples were sequenced and revealed more than 4000 distinct microbial exposures in common between the dust and nasal samples.

In this project, we hope to examine (1) **the association between the microbes in the environment and those found in the nose**. In addition, we are interested in understanding (2) **how the microbes in the environment and nose relate to the development of allergic diseases and asthma in early life**. We are hoping that advanced statistical methods can be employed to recognize whether specific environmental and/or nasal bacterial communities or discrete taxa within these communities are associated with the development of allergic diseases and asthma. A better understanding of these relationships may ultimately result in adapting the design of buildings and control of exposures to promote healthier environments and reduce allergy and asthma among children at risk.

Abstract Information (continued)

Citations:

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