Evaluation of Surfactant Protein-A to Treat Environmentally Induced Sinusitis

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The average adult, when resting, inhales and exhales about 11,000 liters of air per day. This inhaled ambient air is about 20% oxygen and includes environmental pollutants, such as allergens, bacteria and viruses. Sinusitis or sinus disease is a condition in which the cavities around the nasal passages become inflamed. The disease affects people of all age groups and inflicts staggering health care costs. The thin tissue that lines the nose cavities (sinus epithelium) serves as the first barrier between environmental pathogens and the whole respiratory system. The sinus epithelium is known to produce a number of antimicrobial agents that target and eliminate environmental aggressors (allergens, bacteria and viruses). Surfactant protein A (SP-A) is a protein found in the lungs and provides the first line of defense by helping to fight pathogens. Our data show for the first time that SP-A is present in the sinus epithelium and that its levels are changing when there is a bacterial sinus infection. These observations lead us to believe that SP-A plays a central role in sinusitis. We also believe that dysfunctional SP-A contributes to development of the disease and that exogenous administration of SP-A can have beneficial effects in sinusitis. The current therapies are symptomatic, and they fail to address the causes of the disease. To find the causes of the disease we are employing a number of experimental approaches. We are accessing both environmental (different pathogens) and genetic factors that contribute to the development of sinusitis. We have performed a genetic screening of individuals that appear prone to sinusitis and we have found individuals that have a single nucleotide polymorphism in SP-A gene have increased odds of developing sinusitis by almost 3 times. We also have access to genetically modified mice that express the human SP-A instead of the mouse SP-A. Thus, we are able to perform the above experiments not only in human sinus samples but also in live animals, which increases the chances of our success. Additionally, we have access to pure SP-A and we will administer it to live animals and access whether it can be used as a potential treatment against sinusitis. The use of SP-A as an antimicrobial treatment for sinus disease is a new concept and is likely to open new horizons and feasible therapeutic interventions.