



Tissue Engineered In Vitro Human Airway Models (EpiAirway™) of Asthma and COPD

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Asthma and chronic obstructive pulmonary disease (COPD) are two leading chronic respiratory diseases in industrialized countries. However, reliable in vitro human models are not widely available to researchers attempting to understand pathogenesis and develop therapeutic interventions for these diseases. Here we report on a program to create and maintain a human cell bank derived from airway epithelium of diseased individuals, and production of tissue engineered in vitro models of asthma and COPD from the cells. Tracheobronchial tissues are obtained from non-transplantable organs donated from normal, asthmatic or COPD individuals. Epithelial and mesenchymal cells are isolated, cryopreserved and maintained in a cell bank. As needed, cells are recovered and utilized to produce in vitro tissue engineered models. Tissue engineered models are cultured at the air-liquid interface and consist of well-differentiated human tracheal/bronchial epithelium (EpiAirway™) as well as human airway epithelium co-cultured with donor-matched human airway mesenchymal cells (EpiAirway-FT™). The models have pseudostratified epithelia with mucociliary phenotype similar to in vivo tracheobronchial epithelium. They can be cultured for several months, allowing for long-term experiments. These in vitro human models of asthma and COPD provide important unique attributes that animal models cannot provide, including the ability to address human individual variability and genetic factors and a means to determine mechanisms of human virus elicitation of asthma and COPD exacerbations. They will provide researchers important new tools for investigating the role of airway epithelium and mesenchymal cells in asthma and COPD pathogenesis and development and testing of new therapeutic treatments for these diseases.

Funded by NHLBI R43HL088807-01

To be presented at WC7, the 7th World Congress on Alternatives and Animal Use in the Life Sciences, August 30 to September 3, 2009, Rome, Italy