

Airway Smooth Muscle Remodeling in COPD

Abstract: Although airway smooth muscle hyperplasia and hypertrophy are prominent features of airway remodeling in asthma and are thought to contribute to chronic airway obstruction, the type and degree of airway smooth muscle remodeling that occur in COPD are less well understood. In prior studies, we have developed quantitative methods for the study of mass of airway smooth muscle in the airway wall, for measurement of the size of individual airway smooth muscle cells and for enumeration of the number of airway smooth muscle cells per unit of airway (1). Using these methods, we have demonstrated that even mild to moderate asthma is associated with smooth muscle hyperplasia in the large airways (2). In a follow-up study, we showed that airway smooth muscle cell hyperplasia (but not hypertrophy) is also present in the large airways in cystic fibrosis (3), a chronic obstructive pulmonary disease characterized by suppurative rather than allergic airway inflammation. In this concept sheet, we propose to study airway smooth muscle cell hyperplasia and hypertrophy in COPD using paraffin embedded tissue sections or blocks from subjects with COPD and control subjects as collected by the LTRC. We hypothesize that airway smooth muscle changes in COPD will be similar to those seen in cystic fibrosis, and will be detectable in the small airways. This study will be performed using 3 μm thick sections that are immunostained with an antibody to α -smooth muscle actin and three additional serial sections stained with hematoxyllin eosin (two sections) or trichrome (1 section). Airway smooth muscle mass, cell size and cell number will be measured using methods from design-based stereology in subjects with COPD (stratified by GOLD classification) and healthy controls. To ensure sufficient numbers of sections to test conditions on these sections, we request at least six serial sections in total from each subject.