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Title: Changes in the small airways in idiopathic pulmonary fibrosis

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Body: Introduction and Aims: Idiopathic Pulmonary Fibrosis (IPF) is an interstitial lung disease characterized by architectural deformation of the parenchyma due to fibrosis. The structural changes of the small airways in IPF are unclear. Micro-CT can be used to examine alterations of the terminal bronchioles (TB) in IPF. Methods: Explant lungs from patients with IPF (n=7) undergoing lung transplantation and from unused donor lungs -control- (n=5) were collected. Lungs were inflated to TLC with air and frozen solid in liquid nitrogen vapor. Each explant lung underwent ex vivo CT scan to calculate lung volume and mass. Lungs were cut from apex to base into 2 cm-thick slices and a random core (1.4 cm diameter and 2 cm length) taken from each slice was processed for micro-CT examination. Using micro-CT scans of each core, the number of TB per ml of lung volume and per total lung volume, minimal lumen diameter and area of TB were assessed. Results: Explanted IPF lungs were decreased in volume and increased in mass compared to control ($p=0.0025$; $p=0.010$). The number of TB/ml of lung volume ($p<0.001$) and total number of TB/lung ($p<0.05$) were decreased in IPF. The diameter and area of individual TB were on average increased in IPF ($p<0.001$; $p<0.001$) but the total area of all of the TB was decreased ($p<0.05$) in IPF. Conclusion: These data confirm that the TB are reduced in number and total area in IPF and that the surviving airways tend to have slighlty dilated lumens.