1. Background and Objectives

Idiopathic Pulmonary Fibrosis (IPF) is a chronic lung disease of unknown cause associated with the development of progressive and irreversible fibrosis of the lung parenchyma. IPF affects approximately 3 million people worldwide, with a mean survival rate of 2-3 years after diagnosis. Intercostal lung abnormalities (ILA) have been postulated as an early-stage imaging finding of pulmonary fibrosis; it shares common genetic variants with IPF.

2. Methods

Subjects with IPF, ILA and controls were enrolled at Brigham and Women’s Hospital, Boston, MA. Breath Biopsy samples were collected before and after a six minute walk (SMWT) using the Breath Biopsy® Platform (Figure 2), developed by Owlstone Medical, and analyzed with thermal desorption gas chromatography mass spectrometry (TD-GC-MS) using the Breath Biopsy Platform.

3. Results

129 distinct molecular features (MFs) were detected by TD-GC-MS, of which 22 MFs were shown to differ (unadjusted p<0.05*) between IPF patients and controls pre-SMWT (Figure 4A). In both cases, pre- and post-SMWT, the sample size was too small for comparison of adjusted p-values. When pre- and post-SMWT analysis was combined a total of 34 MFs had evidence of difference between IPF and control (unadjusted p < 0.05*) (Figure 4C).

ILA vs. controls analysis, 4 MFs pre-SMWT and 6 MFs post-SMWT showed evidence of change. Combining pre- and post- analysis revealed 2 MFs with evidence of difference between ILA and Control (unadjusted p < 0.05*).

Most of the MFs that showed a statistically significant difference in IPF vs control also showed a similar trend in ILA vs. control (although not significant) (Figure 5). These MFs showed potential as predictors of which ILA subjects might develop IPF.

4. Conclusions and Further Work

A robust relationship was found between MFs and IPF status (vs Control). MFs seem to be informative in predicting IPF.

Based on these results it may be possible to predict some ILA subjects to be more likely to develop IPF than others; however, follow-up diagnosis is needed to help confirm such a model. A relationship was found between MFs and DLCO impairment. There was some evidence to suggest that MFs are different between ILA and controls. Interestingly, most of these MFs showed a similar correlation between IPF and controls. Some MFs that differed in IPF vs ILA, likely reflecting biological mechanisms that are more distinct between IPF and ILA than between ILA and controls.

Our study was limited due to small ILA group size. Reopening recruitment of this study was unlikely to increase the statistical power due to increase sample variation. The next step for this work would therefore be a separate validation study to test all findings.

5. References


Further Resources

Breath Biopsy® Discovery of Biomarkers for IPF and ILA
Breath Biopsy for Respiratory Disease webinar
Owlstone Medical’s respiratory webinar
Breath Biopsy Products & Services
owlstonemedical.com/products