DISEASE PROGRESSION IN IPF ASSESSED USING PULMONARY FUNCTION TESTS AND FUNCTIONAL RESPIRATORY IMAGING (FRI) – A PILOT STUDY

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Functional respiratory imaging (FRI)

In the FRI workflow, CT images are converted into 3D patient specific quantifiable endpoints. FRI yields the following parameters:

- Internal airflow lobar distribution (IALD)
- Lung volume (iVlung)
- Lobe volume (iVlobe)
- Airway volume (iVaw)
- Airway resistance (iRaw)
- Lobar perfusion (BVD)
- Aerosol deposition

Previously it was shown that:

- FRI is 3-8 times more sensitive than the classic pulmonary function tests (PFT) to evaluate treatment¹,²
- FRI is optimal to understand the exact mode of action of a treatment in early clinical research³
- Changes in FRI parameters correlate with changes in lung function and changes in patient feeling⁴

Hypothesis

Disease progression is correlated with a reduced lobar volume, an enlarged airway volume and a reduced airway impedance.

Methods

In this trial we studied 5 IPF patients for 6 months to assess the changes in airway structure and function. At the baseline and 6 month visit FVC, DLCO and helium based lung volumes were measured. In addition, HRCT-based functional respiratory imaging (FRI) was performed in all patients. FRI provides information regarding lobar volumes, regional airway volumes and impedance.

Results

A significant negative correlation (R=-0.9, p<0.0001) was observed between the change in image based airway volume and the change in FVC.

A positive trend (R=0.82, p=0.08) was observed between the change in FRC volumes of the upper lobes and the change in DLCO.

Conclusion

The study suggests that disease progression is associated with a reduction in regional lung volume, an increase in regional airway volume and a reduction in regional impedance. Further studies need to confirm these initial observations.