FUNCTIONAL RESPIRATORY IMAGING AS A SENSITIVE BIOMARKER TO ASSESS THERAPEUTIC INTERVENTIONS IN LUNG DISEASES

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Aims
Previous trials [ERJ 2012;298-305, Respiration 2013;393-401] did demonstrate that both FEV₁ and functional respiratory imaging (FRI) based biomarkers of airway volume (iVaw) and resistance (iRaw) can evaluate the effects of treatment in asthma and COPD. In those trials, it has been shown that FRI is 2-6 times more sensitive to pick up treatment responses as compared to FEV₁. The current work aims to investigate the relation between observed changes in FEV₁ and FRI in a large longitudinal cohort of asthma and COPD patients.

Methods
A retrospective analysis was performed on a set of asthma (n=79; JBiometh 2008;106-113 n=10; NCT00910793 n=26; NCT01650441 n=27 and NCT01955664 n=16) and COPD (n=49; NCT01329276 n=10, NCT01204034 n=27, NCT00911651 n=6 and NCT00911651 n=6) patients that underwent pre and post bronchodilator treatment lung function and FRI assessment.

To investigate the relationship between changes in FEV₁ and changes in FRI parameters linear models with zero intercept between changes in FEV₁ (%p) and iVaw (%) or iRaw (%) were created in R. Statistical significance was set to p<0.05.

Results
Results show a good correlation (p<0.001; R²=0.47, slope=3.34) between changes in FEV₁ and changes in iVaw. The correlation between changes in FEV₁ and changes in iRaw was even stronger (p<0.001; R²=0.53, slope=3.86). Also, when the asthma and COPD populations were analyzed separately, similar results appear.

Conclusion
The current work demonstrates a good correlation between observed changes in FEV₁ and FRI biomarkers. However, for a similar clinical response, the signal in FRI outcome seems to be 3-4 times larger as compared to the current gold standard measure (FEV₁) to assess the effects of respiratory treatments in asthma and COPD patients. Also, while FEV₁ provides one black box measure for the whole lungs, FRI parameters can be assessed very regional. FRI seems to be an ideal tool for evaluating the more subtle changes in lung function caused by anti-inflammatory compounds.