**INTRODUCTION**

COPD exacerbations are characterized by increased dyspnea and decreased pulmonary function. Both the cause and the course of the exacerbation are heterogeneous. In exacerbations, an increase in airway resistance and/or hyperinflation is often observed although very difficult to measure by lung function. Recovering from a COPD exacerbation is typically associated with an improvement in FEV1.

**AIM**

We aimed to study how this change in FEV1 is explained by changes in Functional respiratory imaging (FRI) measures, a novel technique which calculates volumes and resistances by computational fluid dynamics on a regional level from high resolution CT scans.

**PATIENTS**

In 3 centers in Europe, a total of 53 patients presenting with an acute exacerbation of COPD were recruited. Exacerbation was defined by an increase in symptoms lasting at least 2 days and necessitating a change in therapy. Post-bronchodilator CT and spirometry measurements were performed ≤ 5 days from presentation with the exacerbation and were repeated 42 days (17 days) later.

**STATISTICS**

The relations between FEV1 and FRI were tested using multiple regression models (MRM). Three different types of regional FRI (airway volume and resistance, and hyperinflation) inputs were used to predict FEV1 changes:

1. Central airways (generations 1-2) versus larger airways (generations 3-10) (MRM1)
2. Upper (right upper, right middle and left upper lobe) versus lower lobes (right lower and left lower lobe) (MRM2)
3. Central airways combined with split upper/lower lobes for the larger airways (generations 3-10) (MRM3)

**RESULTS**

45%, 63% and 92% of the variation in the improvement in FEV1 was explained by MRM1, MRM2 and MRM3, respectively (all p<0.01, Anova χ²). MRM3 was a significantly better predictor of ΔFEV1 as compared to MRM2, which in its turn was better than MRM1 (both p<0.01, Anova χ²).

**CONCLUSION**

The analysis suggests that changes in FEV1 after the recovery from AE are mainly influenced by the responses in airway volume/resistance and hyperinflation that is observed in both the upper and lower lobes separately. FRI parameters were able to explain >90% of the change in FEV1.