

The Impact of an Oscillating Positive Expiratory Pressure (OPEP) Device on Mucus Plugs: A Case Study Using Functional Respiratory Imaging (FRI) and a COPD patient

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RATIONALE

A previously published FRI clinical study¹ had reported a shift in internal airflow distribution (IAD) to the lower lobes of a COPD patient following use of an OPEP (Aerobika*) device for 3 weeks. This shift was subsequently associated with an increase in FEV1. Given the more recent availability of mucus plug detection as part of the FRI technology, we wanted to investigate this association further.

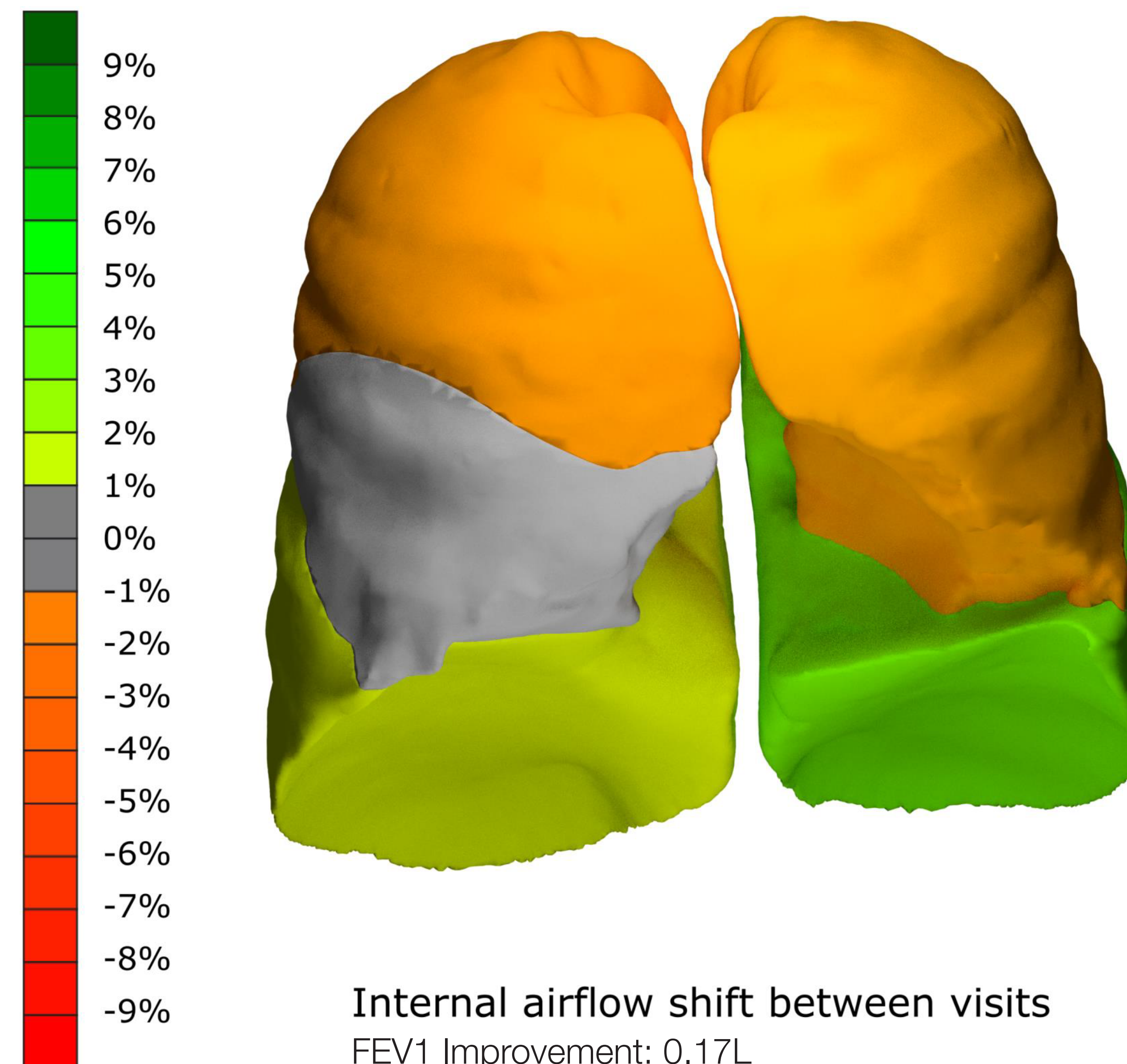
METHODS

The IAD and pulmonary function test (PFT) data for the COPD patient in the referenced study were evaluated in detail to understand IAD values in different lobes pre and post OPEP intervention, as were the results for FEV1 and FVC. The FRI technology was also used to re-examine the CT images of the patient to assess location, number and volume of mucus plugs before and after OPEP intervention.



RESULTS

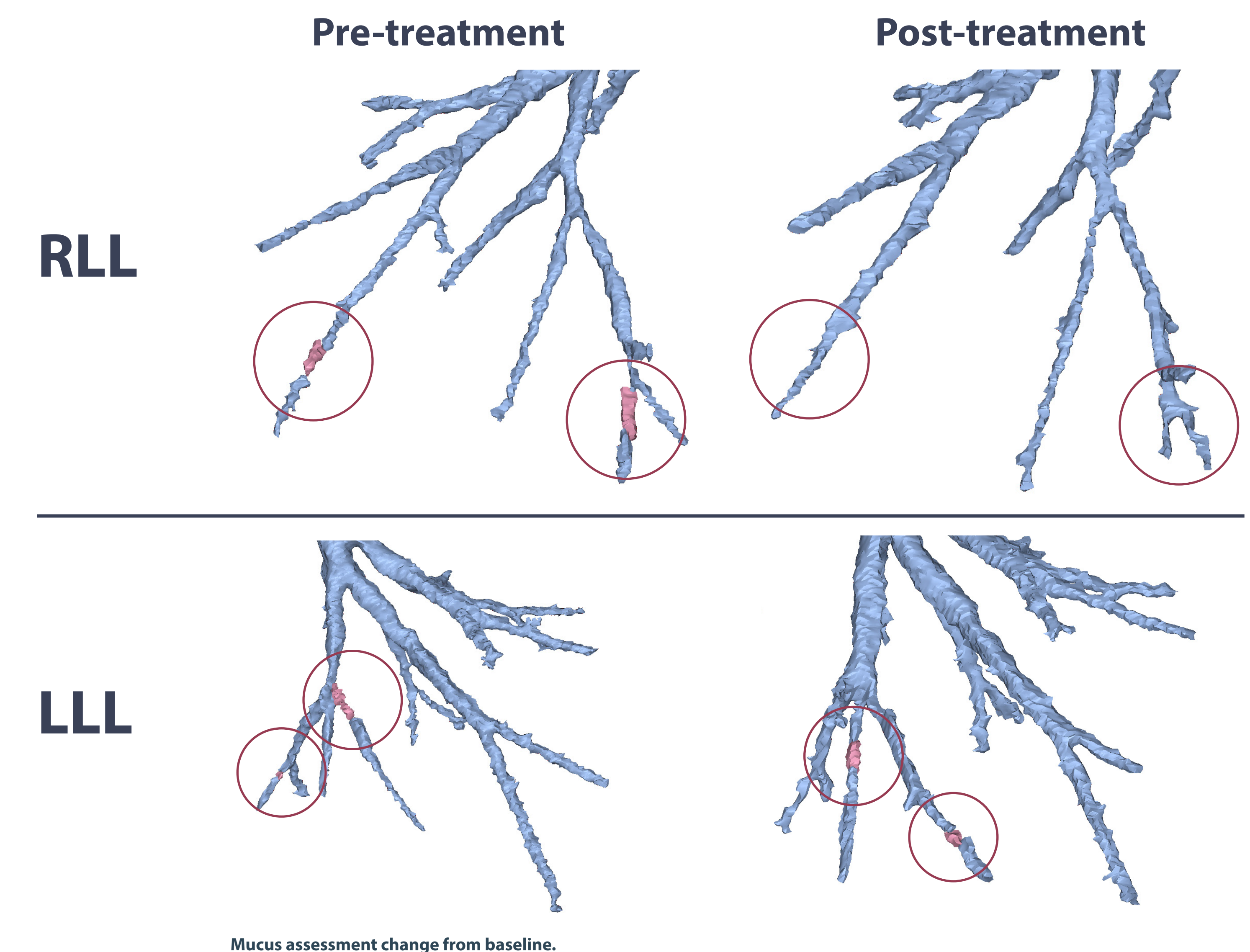
The patient's upper lobe IAD decreased from 39.7% to 32.8% after OPEP contrasting to an increase in lower lobe IAD from 60.3% to 67.2%. **The FEV1 for the same patient had a clinically significant increase from 2.48L to 2.65L** and their FVC increased from 4.41L to 4.48L.



Analysis of the mucus plugs is reported in the table below.

Lobe location	UCSF Mucus Score ² (before / after OPEP)	Mucus Volume (ml) (before / after OPEP)
Right-Upper Lobe	0 / 0	0 / 0
Right-Middle Lobe	0 / 0	0 / 0
Right-Lower Lobe	2 / 0	0.033 / 0
Left-Upper Lobe	0 / 0	0 / 0
Left-Lower Lobe	2 / 2	0.035 / 0.034
Total	4 / 2	0.068 / 0.034

Associated lung images were also generated.



CONCLUSIONS

The FRI analysis of mucus plug presence (and associated visual images) indicated that both mucus plugs originally present in the right lower lobe of the patient were no longer present post OPEP. This was linked to a decrease in mucus volume of 0.033ml in the same lobe. This evaluation shows the utility of the mucus detection technology within the FRI assessment, proposes a potential explanation for the increase in lower lobe airflow distribution and increased FEV1 and FVC following OPEP therapy in this patient, and **highlights the potential value of OPEP therapy in clearing the airways of excess secretions / plugs.**