The Use of Functional Respiratory Imaging to Investigate the Impact of an Oscillating Positive Expiratory Pressure Device on Lung Dynamics and Drug Deposition

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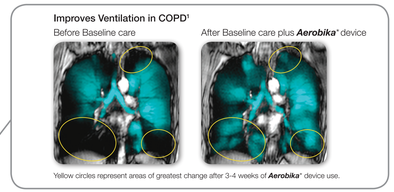
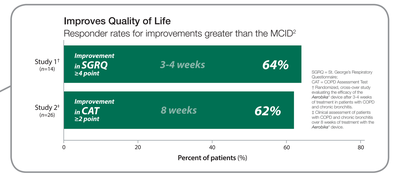
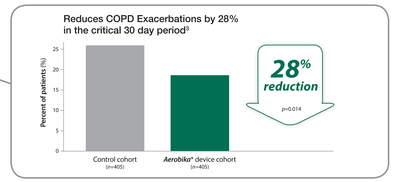
BACKGROUND

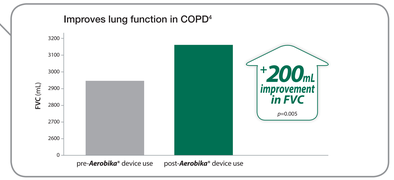
- The ***Aerobika**** Oscillating Positive Expiratory Pressure (OPEP) device has previously been reported as providing benefits to Chronic Obstructive Pulmonary Disease (COPD) patients in terms of lung ventilation, lung capacity, quality of life and reduced exacerbations

- This abstract reports the results of a **pilot Functional Respiratory Imaging (FRI) study** which attempts to provide some lung dynamics understanding following use of the device, as well as how such lung dynamics might relate to drug deposition







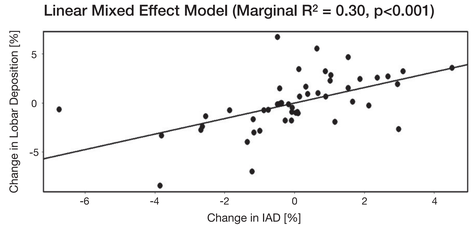


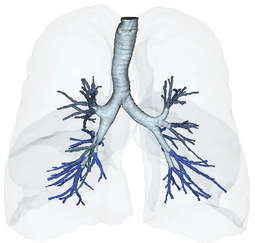
METHODS

- A single center, prospective study, was performed in COPD patients whereby subjects were instructed to use the ***Aerobika**** device for 10 minutes, then take their standard of care medication, continuing to use the device twice daily for 15+/-3 days
- Ten subjects were investigated
  - 7 male, 3 female
  - Mean age 67.3±9.6 years
  - Mean FEV1 55±18.0% predicted
- Paired inspiratory-expiratory high-resolution CT (HRCT) scans were taken before and after the start of the treatment period
- Afterwards, FRI was used to evaluate changes in the lung dynamics and deposition of concomitant medication

RESULTS

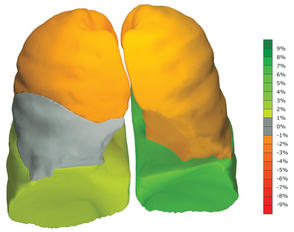
- Analysis of individual lobes indicated a shift in internal airflow distribution (IAD) between -7% and +5%, significantly correlating to airway deposition of the concomitant medication





Visualization of lung dynamics of COPD patient.

Single patient example: showing redistribution of airflow towards lower lobes.



Colour change represents internal airflow change from the start to the end of the study period.

- Additionally, it was observed that patients in whom the airflow was redistributed towards the lower lobes exhibited increased FEV1 values

CONCLUSIONS

- These pilot study results provide evidence supporting the theory that this specific OPEP device enables airflow redistribution and influences drug deposition patterns
- Further research is required to investigate the lower lobar ventilation relationship with FEV1
- The resultant airflow redistribution following use of the device may well be a contributing factor to the previously reported[1-4] improved clinical outcomes, and the specific nature of the redistribution might also be related to the level of clinical response observed

1 Svenningsen S, Paulin GA, Sheikh K, *et al. Oscillatory Positive Expiratory Pressure in Chronic Obstructive Pulmonary Disease.* Journal of COPD 2016;13(1):66-74.

2 Stockley RA. Abstract presentations: COPD10, Birmingham, United Kingdom, 2016. Chronic Obstr Pulm Dis. 2017; 4(3): 225-246. doi: http://doi.org/10.15326/jcopdf.4.3.2017.0137.

3 Burudpakadee C, Seetasith A, Dunne P, *et al. A real-world study of 30-day exacerbation outcomes in chronic obstructive pulmonary disease (COPD) patients managed with **Aerobika**® OPEP.* Pulmonary Therapy. 2017; 3(1):163-171.

4 Adapted from Svenningsen S, Paulin GA, Sheikh K, *et al. Oscillatory Positive Expiratory Pressure in Chronic Obstructive Pulmonary Disease.* Journal of COPD 2016;13(1):66-74.

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