

# REMOVAL OF DISEASED EMPHYSEMATOUS TISSUE WITH BRONCHOSCOPIC THERMAL VAPOR ABLATION (BTVA®)

## Authors:

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## INTRODUCTION

Patients with severe emphysema typically have segments that are more diseased and hyperinflated than others. These segments have low density, poor ventilation, and minimal gas exchange, contributing to hyperinflation, reduced pulmonary function and quality of life (QOL). Reducing hyperinflated air volume of emphysematous segments with BTVA®, leads to an increase in healthier non-treated segments resulting in statistically significant and clinically meaningful improvements in lung function and QOL at 12-months with a low rate of major complications. The authors hypothesize that in addition to reduced hyperinflation, reduction in tissue mass may contribute to patient improvement, particularly QOL as this measure for BTVA® has consistently been superior relative to other non-mass reducing bronchoscopic lung volume therapies. Mass reduction in diseased segments and increase in healthier untreated segments could have significant clinical importance, if the mass represents perfusion.

## OBJECTIVE

To investigate the first fundamental question: Does BTVA® remove mass in the ablated most diseased segments and increase the mass of untreated healthier segments?

## METHODS

All treated patients from the Step-UP RCT with available baseline and 6-month follow-up scans (n=41) were quantitatively (QCT) analyzed with VIDA Apollo software. Changes in lobar and segmental tissue mass were measured.

## RESULTS

Treated segments had an average tissue mass removal of 14.1 grams (SD=13.4 g) a 22% reduction in mass. 98% of segments ablated had mass reduction. Preserved segments within those lobes had an average tissue mass increase of 7.8 g (SD=16.5 g) after each procedure. Net result of treated diseased segment mass reduction and untreated healthier segment mass was an average tissue mass reduction of 7.2 g (SD=16.8 g) in the lobe after each procedure.

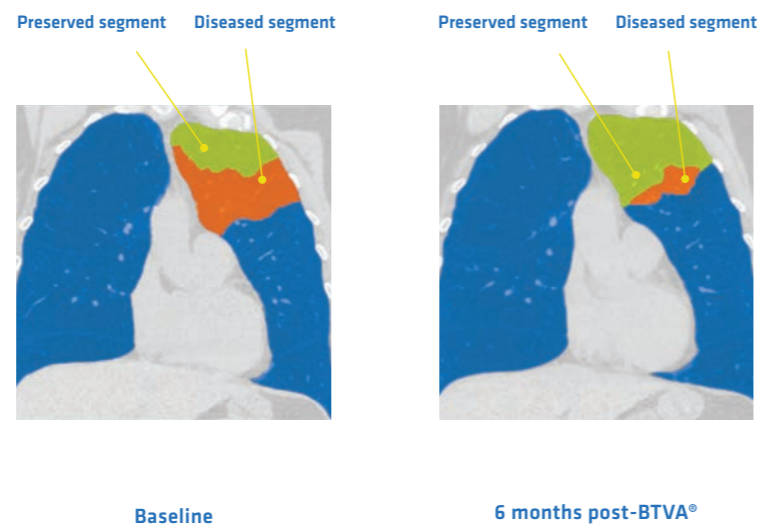
## CONCLUSION

BTVA® typically removes mass of ablated most diseased segments and increases mass in healthier segments. One physiologically plausible explanation for increase in mass of the untreated segments is perfusion increase through shunting. This is the next question to answer now that a shift in mass from diseased to healthier segments has been established. With the advent of practical measurement techniques for segmental perfusion and ventilation, a future study will be performed to determine to what extent perfusion shift contributes to patient improvements. Additionally, data from these measures may elucidate ways to better identify BTVA® responders and outcomes.

## VAPOR REMOVES DISEASED TISSUE

STEP-UP RCT Diseased Tissue Mass Changes (6 months)	Post-treatment Diseased Tissue Change (g) (N=41)	Post-treatment Diseased Tissue % Change (g) (N=41)
Reduced Segment(s)	-27g (20g)	-22% (15%)
Preserved Segment(s)	+16g (22g)	+11% (21%)
Treated Upper Lobe	-14g (26g)	-5% (10%)
Preserved Middle Lobe	+4g (8g)	+10% (35%)
Preserved Lower Lobe	+18g (42g)	+11% (25%)

Data is mean change (SD).



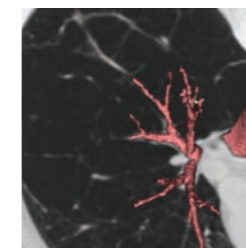
## REDUCTION IN MASS FROM ABLATION OF PARENCHYMA

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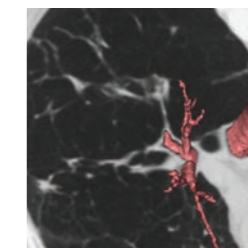
## VAPOR ABLATION EXAMPLE PATIENTS

### STEP-UP Pt 202010 6mo:

- 52% Vol. Reduction RB2
- 24% Mass Reduction RB2
- 18% Vol. Reduction LB1&3
- **3% Mass Reduction LB1&3**
- 13% FEV1 Improvement
- 12Pt SGRQ Improvement



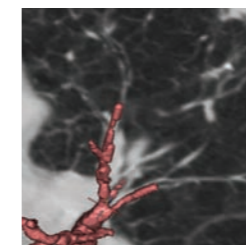
Baseline RB2



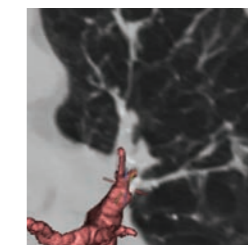
6 Month RB2

### STEP-UP Pt 212003 6mo:

- 28% Vol. Reduction LB1&2
- 22% Mass Reduction LB1&2
- 7% Vol. Reduction RB1&2
- **16% Mass Reduction RB1&2**
- 24% FEV1 Improvement
- 21Pt SGRQ Improvement



Baseline LB1&2



6 Month LB1&2

- Minimal scarring and fibrosis of parenchyma
- Truncation of treated segment airway