

## Positive airway pressure-enhanced CT to improve virtual bronchoscopic navigation

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### INTRODUCTION

CT scan acquisition protocol is pivotal for segmentation covering the utmost periphery. We hypothesize that application of continuous positive airway pressure (CPAP) during CT acquisition could improve segmentation.

### OBJECTIVES

Compare quality of segmentations under 4 CT acquisitions: inspiration (INSP), expiration (EXP) and both with CPAP (INS-CPAP and EXP-CPAP).

### MATERIALS AND METHODS

320-detector row CT scans (Aquilion ONE™, Toshiba) were performed in INSP, EXP, INS-CPAP and EXP-CPAP using EzPAP® (Smiths Medical) pressures 6-10 cmH<sub>2</sub>O for 3' in 4 patients. Segmentations obtained and compared with VBN (LungPoint®, Broncus) and their quality assessed by randomly selecting 2 distal bronchi per lobe and counting bifurcations (BIF) achieved and absolute (DIST) and relative (DIST%) distances from carina to most distal bronchi. DIST% were computed dividing DIST by lung's largest axis.

### RESULTS

2-way ANOVA interaction not significant: p-values and means for column [table1] and row [table2] factors.

### CONCLUSIONS

- 1) DIST and BIF might not be accurate enough for comparing segmentations in different phases of the respiratory cycle nor different lungs, due to their varying size.
- 2) Though not significant, DIST% are larger for EXP-CPAP indicating that use of CPAP might improve segmentation in VBN and encouraging further analysis of CPAP-enhanced CT.

### DISCLOSURE

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**Table 1. Comparison of segmentation quality for CT acquisition**

	<b>INSP</b>	<b>INSP-CPAP</b>	<b>EXP</b>	<b>EXP-CPAP</b>	<b>ANOVA (p-value)</b>
<b>BIF (mean)</b>	6.87	6.63	4.98	5.42	$4 \times 10^{-10}$
<b>DIST (mean)</b>	158.3056	158.3333	116.8889	129.9722	$3 \times 10^{-12}$
<b>DIST%</b>	68.6108	67.7883	62.1827	70.5244	0.0545

**Table 2. Comparison of segmentation quality for lung**

	<b>Right lung</b>	<b>Left lung</b>	<b>ANOVA (p-value)</b>
<b>BIF (mean)</b>	6.0	5.9	0.7098
<b>DIST (mean)</b>	133.9306	147.8194	0.0017
<b>DIST%</b>	65.6210	68.9322	0.1384