

## Online Data Supplement

### ***Deep learning-based segmentation of airway morphology from endobronchial optical coherence tomography***

Zi-Qing Zhou<sup>a\*</sup> Ph.D., Zu-Yuan Guo<sup>a\*</sup> M.D., Chang-Hao Zhong<sup>a\*</sup> M.D., Hui-Qi Qiu<sup>a\*</sup> M.D., Yu Chen<sup>a</sup> Ph.D., Wan-Yuan Rao<sup>a</sup> M.D., Xiao-Bo Chen<sup>a</sup> M.D., Hong-Kai Wu<sup>a</sup> Ph.D., Chun-Li Tang<sup>a</sup> # M.D., Zhu-Quan Su<sup>a</sup> # Ph.D., Shi-Yue Li<sup>a</sup> # M.D.

**\* Drs. Zi-Qing Zhou, Zu-Yuan Guo, Chang-Hao Zhong and Hui-Qi Qiu are co-first authors.**

<sup>a</sup>State Key Laboratory of Respiratory Disease, National Clinical Research Center for Respiratory Disease, Guangzhou Institute of Respiratory Health, The First Affiliated Hospital of Guangzhou Medical University, Guangzhou, China.

**Short Title:** Deep learning-based segmentation of EB-OCT image

**Corresponding Author 1:** Shi-Yue Li. Sate Key Laboratory of Respiratory Disease, National Clinical Research Center for Respiratory Disease, Guangzhou Institute of Respiratory Health, The First Affiliated Hospital of Guangzhou Medical University, Address: 151 Yanjiang Road, Guangzhou, 510120, China. E-mail: lishiyue@188.com

**Corresponding Author 2:** Zhu-Quan Su. Sate Key Laboratory of Respiratory Disease, National Clinical Research Center for Respiratory Disease, Guangzhou Institute of Respiratory Health, The First Affiliated Hospital of Guangzhou Medical University, Address: 151 Yanjiang Road, Guangzhou, 510120, China.

E-mail: py1011xiaoquan@163.com

**Corresponding Author 3:** Chun-Li Tang. Sate Key Laboratory of Respiratory Disease, National Clinical Research Center for Respiratory Disease, Guangzhou Institute of Respiratory Health, The First Affiliated Hospital of Guangzhou Medical University, Address: 151 Yanjiang Road, Guangzhou, 510120, China. E-mail: tcl8182@163.com

## Supplementary Table

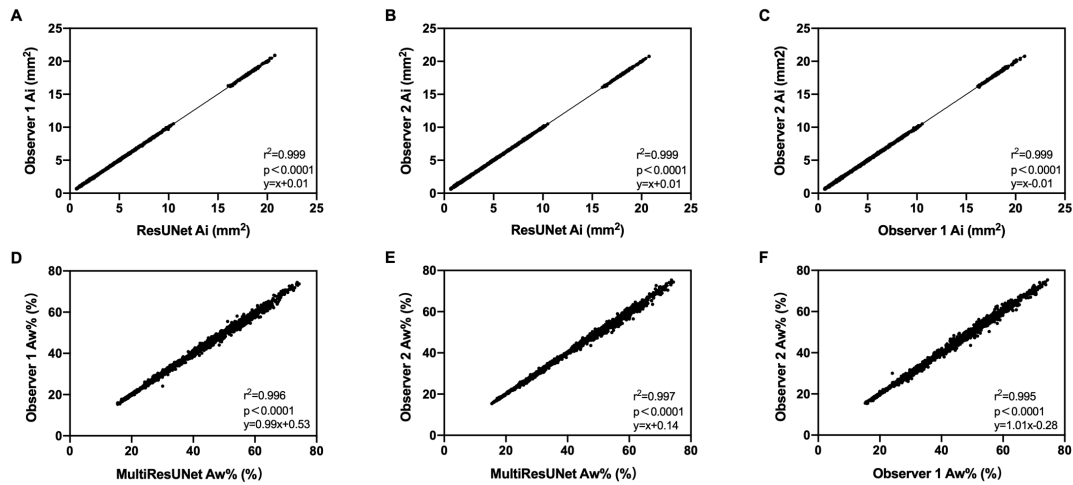
**Table S1. The mean dice similarity coefficient of OCT image segmentations between CNN and observers.**

| mDSC (%)                          | Ai segmentation | Aw% segmentation |
|-----------------------------------|-----------------|------------------|
| Between CNN and Observer 1        | 98.101±6.245    | 96.072±8.131     |
| Between CNN and Observe 2         | 98.481±5.845    | 96.668±7.676     |
| Between Observer 1 and Observer 2 | 97.693±6.819    | 95.816±9.121     |

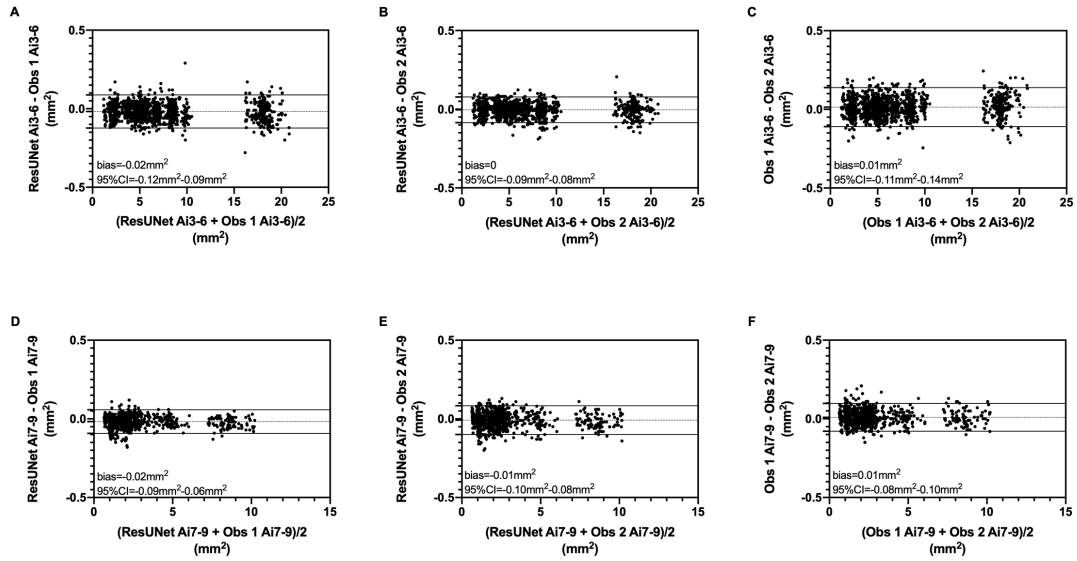
Data in the blank are shown as: Mean±SD.

**Abbreviation:** mDSC: mean dice similarity coefficient; CNN: convolutional neural network, mDSC was calculated between ResUNet and observers for Ai segmentation, and between MultiResUNet and observers for Aw% segmentation.

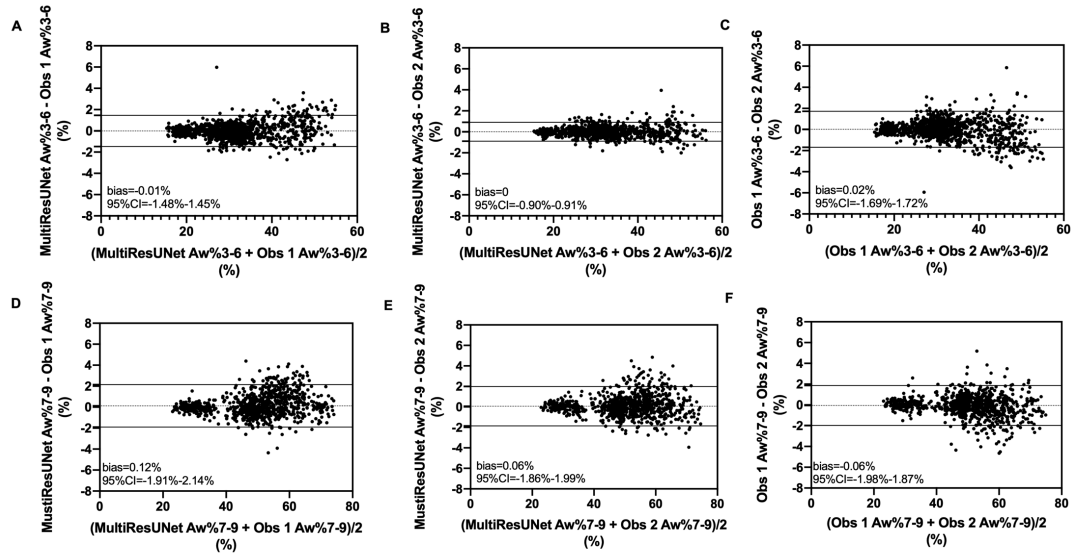
## Supplementary Figures



**Figure S1. The Pearson correlations among the two observers and CNN segmentations for Ai and Aw.** A-C. There was a significant correlation between ResUNet and observer 1 ( $r=0.999$ ,  $P < 0.001$ ), between ResUNet and observer 2 ( $r=0.999$ ,  $P < 0.001$ ) and between two observers ( $r=0.999$ ,  $P < 0.001$ ), for Ai segmentation. D-F. A significant correlation was found between MultiResUNet and observer 1 ( $r=0.996$ ,  $P < 0.001$ ), between MultiResUNet and observer 2 ( $r=0.997$ ,  $P < 0.001$ ) and between two observers ( $r=0.995$ ,  $P < 0.001$ ), for Aw% segmentation. There was more variability between the two observers compared to the variability between the manual and automatic segmentations of Aw%.



**Figure S2. Bland-Altman analysis for two observers and ResUNet segmentations for Ai.** A-C. Bland-Altman analysis indicates a small bias between ResUNet and observer 1 (bias=-0.02mm<sup>2</sup>, 95%CI=-0.12mm<sup>2</sup>-0.09mm<sup>2</sup>), between ResUNet and observer 2 (bias=0 95%CI=-0.09mm<sup>2</sup>-0.08mm<sup>2</sup>) and between two observers (bias=0.01mm<sup>2</sup> 95%CI=-0.11mm<sup>2</sup>-0.14mm<sup>2</sup>) for Ai segmentation from 3<sup>rd</sup> to 6<sup>th</sup> generations of bronchi. D-F. Bland-Altman analysis indicates a small bias between ResUNet and observer 1 (bias=-0.02mm<sup>2</sup> 95%CI=-0.09mm<sup>2</sup>-0.06mm<sup>2</sup>), between ResUNet and observer 2 (bias=-0.01mm<sup>2</sup> 95%CI=-0.10mm<sup>2</sup>-0.08mm<sup>2</sup>) and between two observers (bias=0.01mm<sup>2</sup> 95%CI=-0.08mm<sup>2</sup>-0.10mm<sup>2</sup>) for Ai segmentation from 7<sup>th</sup> to 9<sup>th</sup> generations of bronchi. Solid lines represent the bias and dotted lines represent the 95% confidence intervals.



**Figure S3. Bland-Altman analysis for two observers and MultiResUNet segmentations for Aw%.** A-C. Bland-Altman analysis indicates a small bias between MultiResUNet and observer 1 (bias=-0.01% 95%CI=-1.48%-1.45%), between MultiResUNet and observer 2 (bias=0 95%CI=-0.90%-0.91%) and between two observers (bias=0.02% 95%CI=-1.69%-1.72%) for Aw% segmentation from 3<sup>rd</sup> to 6<sup>th</sup> generations of bronchi. D-F. Bland-Altman analysis indicates a small bias between MultiResUNet and observer 1 (bias=0.12% 95%CI=-1.91%-2.14%), between MultiResUNet and observer 2 (bias=0.06% 95%CI=-1.86%-1.99%) and between two observers (bias=-0.06% 95%CI=-1.98%-1.87%) for Aw% segmentation from 7<sup>th</sup> to 9<sup>th</sup> generations of bronchi. Solid lines represent the bias and dotted lines represent the 95% confidence intervals.