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# Airway morphometry in COPD with bronchiectasis: a view on all airway generations

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**Although terminal bronchioles are equally reduced in COPD lungs with and without bronchiectasis, significantly more large and small airways are found in COPD lungs with bronchiectasis**  
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**Cite this article as:** Everaerts S, McDonough JE, Verleden SE, *et al.* Airway morphometry in COPD with bronchiectasis: a view on all airway generations. *Eur Respir J* 2019; 54: 1802166 [<https://doi.org/10.1183/13993003.02166-2018>].

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**ABSTRACT** The pathophysiological processes underlying bronchiectasis in chronic obstructive pulmonary disease (COPD) are not understood. In COPD, both small and large airways are progressively lost. It is currently not known to what extent the different airway generations of patients with COPD and bronchiectasis are involved.

COPD explant lungs with bronchiectasis were compared to COPD explant lungs without bronchiectasis and unused donor lungs as controls. In order to investigate all airway generations, a multimodal imaging approach using different resolutions was conducted. Per group, five lungs were frozen (n=15) and underwent computed tomography (CT) imaging for large airway evaluation, with four tissue cores per lung imaged for measurements of the terminal bronchioles. Two additional lungs per group (n=6) were air-dried for lobar microCT images that allow airway segmentation and three-dimensional quantification of the complete airway tree.

COPD lungs with bronchiectasis had significantly more airways compared to COPD lungs without bronchiectasis ( $p<0.001$ ), with large airway numbers similar to control lungs. This difference was present in both upper and lower lobes. Lack of tapering was present ( $p=0.010$ ) and larger diameters were demonstrated in lower lobes with bronchiectasis ( $p=0.010$ ). MicroCT analysis of tissue cores showed similar reductions of tissue percentage, surface density and number of terminal bronchioles in both COPD groups compared to control lungs.

Although terminal bronchioles were equally reduced in COPD lungs with and without bronchiectasis, significantly more large and small airways were found in COPD lungs with bronchiectasis.