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Title: Quantification of elastin fibre remodelling in COPD using probe-based confocal laser endomicroscopy (pCLE)

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Body: COPD causes disruption of alveolar elastin and probable disruption of the elastin in the airway wall. pCLE can be used during bronchoscopy to image the elastin structure. A method for the automatic assessment of the directional distribution of the elastin fibres is presented. The structural disorder caused by the remodelling process can then be objectively quantified. Figure 1 shows examples of the analysis output, with detected elastin fibres in green, showing greater disorder in the case of mild COPD.

Figure 2 shows example histograms of the direction of the elastin fibres, showing a clear broadening of the histogram between health and COPD.

Initial results from 8 subjects, 4 healthy and 4 mild COPD (Table 1) demonstrate the difference is significant (independent t-test, $p=0.0363$).

Healthy [standard deviation of angle]	Mild COPD [standard deviation of angle]
27.7812	48.6401
36.7107	49.8444
42.7017	55.0636
44.9255	50.3647

These initial results suggest that this technique has potential as an objective, in vivo measure of elastin remodelling in the airways.

