

S75 QUANTIFICATION OF SMOKING-RELATED AIRWAY REMODELLING IN COPD USING A NOVEL FAST-RESPONSE CAPNOMETER

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Introduction Airway remodelling due to cumulative tobacco smoking and its association with airflow limitation severity in COPD is difficult to characterise using non-specific methods such as spirometry.

Objective To evaluate the relationship between smoking history and features of small to medium-sized airway obstruction in participants with COPD with fast-response capnometry using TidalSense's N-Tidal™ device.

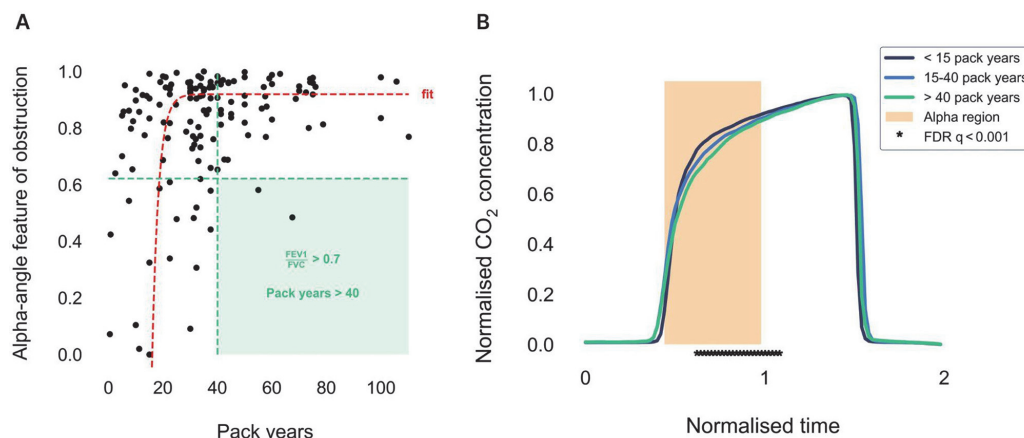
Methods 305 COPD GOLD stage 3/4 participants were included from three longitudinal observational studies conducted in the UK: COPD Breathing Record Study (CBRS); CBRS 2; and the Cardiorespiratory Diagnostic Study (CARES). Tobacco smoking data was collected at baseline; capnography data was collected twice daily for up to 6 weeks. CO₂ features from the expiratory upstroke and plateau phases known to correlate with the degree of airways obstruction in COPD were compared to participants' smoking histories.

Results Higher smoking pack-years was associated with greater curvature in the alpha-angle region, which may relate to structural airway remodelling of smaller airways. The alpha-angle feature of obstruction demonstrated a positive non-linear correlation with pack years, indicating that a greater degree of airways obstruction is associated with increased cumulative exposure to smoking.

Alpha-angle features showed a significantly altered CO₂ waveform geometry beyond 40 pack years, suggesting this level of smoking history may represent a threshold beyond which demonstrable airway remodelling is highly likely. Of participants with over 40 pack years, 96% had an FEV₁/FVC < 0.7, further supporting this hypothesis.

Conclusion CO₂ waveform features of airway obstruction demonstrate a dose-response relationship with cumulative smoking history. N-Tidal may be able to directly probe airway remodelling as a result of smoking, potentially enabling early identification of physiological changes undetectable by spirometry.

Please refer to page A285 for declarations of interest related to this abstract.



Abstract S75 Figure 1 (A) regression plot of CO₂ alpha-angle feature vs. pack years. (B) Average CO₂ waveforms across subjects with <15 pack years, 15–40 pack years and >40 pack years smoking history