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Title: The effect of reducing breath holding time to assess diffusion capacity

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Body: The single breath method to measure diffusion capacity requires a subject to inspire a gas mixture followed by a 10 ± 2 second breath hold. However, dyspnoea may preclude measurement in patients with advanced pulmonary disease. We sought to determine if breath hold time reduction had a significant effect on measured D_LCO values. Forced spirometry and CO-diffusion by the single breath method were performed in duplicate with breath-holding for 10 ± 2 seconds, 8 ± 2 seconds and 6 ± 2 seconds in 30 controls (FEV_1 107 ± 12.04% predicted), 30 severe COPD patients (FEV_1 37.2 ± 7.92% predicted), and 30 patients with interstitial lung disease (ILD) (FEV_1 69.5 ± 17.61% predicted). There was no significant difference between DL_{CO}(SB) and DL_{CO}(VA) measured at 10, 8 and 6 seconds in the control (p=0.4431) and ILD groups (p=0.5915). However, there was a significant difference between DL_{CO}(SB) (p=0.0003) and DL_{CO}(VA) (p=0.0183) measured at 10, 8 and 6 seconds in the COPD group. In the presence of severe airway obstruction the DL_{CO} decreases with breath hold time reduction. However, in healthy controls and patients with ILD, there was no significant change in the DL_{CO} when breath hold time is reduced from 10 to 6 seconds. This could allow for a reduction in breath hold time when measuring the DL_{CO} in patients with advanced ILD who are unable to breath hold for 10 seconds.