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**Title:** Within-breath changes of respiratory impedance in COPD and healthy adults

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**Body:** Reduction of respiratory system reactance (Xrs) in expiration indicates expiratory flow limitation in COPD patients (Dellacà et al., Eur Respir J, 23: 232, 2004). The aim of our study was to determine within-breath changes in respiratory resistance (Rrs) and Xrs, as functions of tidal flow ( $V'$ ) and volume (V). Forced oscillations at 8 Hz were superimposed on quiet breathing in 44 COPD (GOLD III and IV) patients and 13 control subjects (C), and Rrs and Xrs estimated every 1/8 s. Values of Rrs and Xrs were compared at their extremes (min and max), values at minimum (vmin) and maximum volume (vmax), maximum inspiratory (ifmax) and expiratory flow (efmax), and the area of the Xrs vs V loop normalized for V (AXrs). Strong dependence of Rrs and Xrs on  $V'$  and V were observed in all subjects but with markedly different loop patterns in the two groups.

The differences between COPD and C were highly significant in the group median values of AXrs (4.2 vs 0.5 hPa.s/l), Xrs(min) (-9.8 vs -2.1 hPa.s/l), Xrs(vmin) (-4.7 vs -0.5 hPa.s/l), and Xrs(efmax) (-4.8 vs -0.4 hPa.s/l), Rrs(ifmax) (5.1 vs 3.9 hPa.s/l), all  $P < 0.01$ , but not in eRrs(fmax) (5.20 vs 5.17 hPa.s/l). Tracking of oscillatory impedance can be accomplished easily with minimum demand for cooperation and no complex respiratory manoeuvres, and reveals characteristic within-breath changes in airway size and rheology. The development of flow limitation is seen in COPD.