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# Day-to-day variability of forced oscillatory mechanics for early detection of acute exacerbations in COPD

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**Telemonitoring of day-to-day variations in lung function using oscillometry in COPD may help assess symptoms and detect acute exacerbations early** <https://bit.ly/2RUhn7c>

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## ABSTRACT

**Background:** Telemonitoring trials for early detection of acute exacerbations of chronic obstructive pulmonary disease (AECOPD) have provided mixed results. Day-to-day variations in lung function measured by the forced oscillation technique (FOT) may yield greater insight. We evaluated the clinical utility of home telemonitoring of variability in FOT measures in terms of 1) the relationship with symptoms and quality of life (QoL); and 2) the timing of variability of FOT measures and symptom changes prior to AECOPD.

**Methods:** Daily FOT parameters at 5 Hz (resistance (R) and reactance (X); Resmon Pro Diary, Restech Srl, Milan, Italy), daily symptoms (COPD Assessment Test (CAT)) and 4-weekly QoL data (St George's Respiratory Questionnaire (SGRQ)) were recorded over 8–9 months from chronic obstructive pulmonary disease (COPD) patients. Variability of R and X was calculated as the standard deviation (SD) over 7-day running windows and we also examined the effect of varying window size. The relationship of FOT *versus* CAT and SGRQ was assessed using linear mixed modelling, daily changes in FOT variability and CAT prior to AECOPD using one-way repeated measures ANOVA.

**Results:** Fifteen participants with a mean±SD age of 69±10 years and a % predicted forced expiratory volume in 1 s (FEV<sub>1</sub>) of 39±10% had a median (interquartile range (IQR)) adherence of 95.4% (79.0–98.8%). Variability of the inspiratory component of X (indicated by the standard deviation of inspiratory reactance (SDX<sub>insp</sub>)) related to CAT and weakly to SGRQ (fixed effect estimates 1.57, 95% CI 0.65–2.49 (p=0.001) and 4.41, 95% CI –0.06 to 8.89 (p=0.05), respectively). SDX<sub>insp</sub> changed significantly on the same day as CAT (1 day before AECOPD, both p=0.02) and earlier when using shorter running windows (3 days before AECOPD, p=0.01; accuracy=0.72 for 5-day windows).

**Conclusions:**  $SDX_{\text{insp}}$  from FOT telemonitoring reflects COPD symptoms and may be a sensitive biomarker for early detection of AECOPD.