



## Plethysmographic measurement of intrinsic PEEP in stable COPD patients at rest

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### ABSTRACT

**Background:** In stable chronic obstructive pulmonary disease (COPD), intrinsic positive end-expiratory pressure (PEEP<sub>i</sub>) due to tidal expiratory flow-limitation (FL) is responsible for the increase in work of breathing and for adverse haemodynamic effects. PEEP<sub>i</sub> during spontaneous breathing can be only measured invasively with the esophageal balloon technique (ES).

**Aims:** To obtain a non-invasive estimation of PEEP<sub>i</sub> in stable COPD patients using a commercially available plethysmograph (PEEP<sub>i,pl</sub>) and to compare it with existing data on PEEP<sub>i</sub> obtained with ES (PEEP<sub>i,es</sub>) [Haluszka, J. et al. *Am Rev Respir Dis* 1990; 141:1194-97; Dal Vecchio, L. et al. *Eur Respir J* 1990; 3:74-80].

**Methods:** Stable mild to very severe COPD patients performed body-plethysmography before and after bronchodilation (BD) according to current guidelines. PEEP<sub>i,pl</sub> was calculated by converting into alveolar pressure the shift volume measured at the end of a spontaneous tidal expiration. FL was assessed with the negative expiratory pressure method.

**Results:** 62 COPD patients were enrolled (mean±SD 72±7 years; 40 males). At baseline patients with FL (N=35) exhibited a higher PEEP<sub>i,pl</sub> than those with no FL (0.8±0.4 vs 0.3±0.2 cmH<sub>2</sub>O, P<0.01). After BD PEEP<sub>i,pl</sub> decreased (P=0.01) similarly in both groups (-12% vs -15%). As previously documented for PEEP<sub>i,es</sub>, PEEP<sub>i,pl</sub> was correlated with FEV<sub>1</sub> (R=-0.597), vital capacity (R=-0.541), inspiratory capacity (R=-0.521) and residual volume (R=0.489), all P<0.01. However, PEEP<sub>i,pl</sub> and changes post-BD were lower than previously reported for PEEP<sub>i,es</sub> (2.4±1.5 cmH<sub>2</sub>O and -60%).

**Conclusions:** Although further implementations are necessary, the non invasive assessment of PEEP<sub>i</sub> by means of plethysmography appears achievable.

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