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Title: Mechanical restriction to tidal volume expansion partially determines intensity of physical activity in COPD

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Body: Aim: We investigated whether the intensity of movement outdoors adopted by each individual COPD patient during walking, is determined by the degree of mechanical restriction to tidal volume expansion. Methods: Eighteen COPD patients (FEV1 %pred: 48±14) underwent an indoor treadmill walking test at a speed corresponding to each individual patient's average outdoor walking intensity that was captured by the DynaPort Minimod accelerometer during a preceded 7-day period. Chest wall volume variations were computed breath-by-breath by Optoelectronic Plethysmography. Results: Outdoor walking intensity ranged from 1.5 to 2.3 m/s² and it was significantly related to: i) the breathing pattern adopted by each individual patient (breathing frequency: 24±1 breaths/min, r=-0.48; VT/Ti: 1.4±0.08, r=0.51; VT/Te: 1.1±0.1, r=0.6); ii) the degree of dynamic lung hyperinflation (2.16±0.15 L, r=0.55) and iii) the magnitude of both tidal volume expansion (1.68±0.14 L, r=0.58) and minute ventilation (40.2±2.4 L, r=0.84). Variations in minute ventilation with increasing movement intensity were primarily determined by variations in individual patients' tidal volume expansion (r=0.77). Conclusions: For each individual patient outdoor movement intensity is determined by the breathing pattern and the degree of mechanical restriction to tidal volume expansion that the patient exhibits during walking. This work was funded by Innovative Medicines Initiative Joint Undertaking (IMU-JU #115011) and by Thorax Foundation.