Title: Impaired cardiac output responses to incremental exercise measured by signal-morphology impedance cardiography in advanced COPD

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Body: Background: There is renewed interest in the continuous evaluation of cardiac output (Q´T) during exercise in patients with chronic obstructive pulmonary disease (COPD). Signal-morphology impedance cardiography (SMICG) has some advantages over previous impedance approaches and it might be useful to track relative changes in exercise Q´T in this patient population. Objective: To contrast the dynamic changes (Δ) in Q´T as a function of metabolic demand (O₂ uptake, ΔV´O₂) in patients with advanced COPD and healthy controls. Methods: 15 males with COPD (11 GOLD stages III-IV) and 9 gender-matched controls underwent a ramp-incremental test with Q´T being measured by a commercially-available SMICG system (Physioflow™ PF-05, Manatec, France). ΔQ´T/ΔV´O₂ relationship was calculated by linear regression. Results: Patients were significantly younger than controls (61 ± 6 yrs vs. 72 ± 5 yrs, respectively; p<0.01). As expected, patients had lower peak V´O₂ (% predicted) compared to controls (p<0.05). There were no significant between-group differences in the y-intercept or the slope of ΔQ´T (L/min) /ΔV´O₂ (L/min) (p>0.05). Interestingly, however, both parameters were lower in patients than controls when Q´T was expressed as fold-changes (0.90 ± 0.30 vs. 1.22 ± 0.18 and 0.43 ± 0.17 vs. 0.61 ± 0.10, respectively; p<0.05). ΔQ´T at maximal exercise was associated with peak V´O₂ in controls (r= 0.73; p<0.05) but not in patients (r= 0.12). Conclusions: Semi-quantitative SMICG measurements indicated blunted Q´T adjustments to rapidly-incremental exercise in patients with advanced COPD - even when compared to older healthy controls.