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Title: Dynamic oxyhemoglobin saturation changes during Walking and cycling tests in COPD

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Body: Background: Resaturation of oxyhemoglobin saturation (SpO₂) measured with pulse oximetry during exercise has not been addressed. We investigated the patterns and change in SpO₂ (Δ SpO₂) in six-minute walking test (6MWT) and cycling test in COPD patients. Methods: Sixty COPD patients with FEV₁ 54±18%pred estimated the oxygen-cost diagram (OCD) score and performed lung function test and 6MWT. Fifty patients performed cycling test. The patterns of Δ SpO₂ were compared within individual tests and between both tests. Results: In the 6MWT, four patterns of SpO₂ changed: mostly, desaturation-resaturation (46%). The Δ SpO₂≥3% occurred at 1.23 minute. It resaturated at 3.5±1.4 minutes. The Δ SpO₂ between the start and the nadir (Δ SpO₂SN) was greater than that between the start and the end (Δ SpO₂SE) (p<.0001). The non-desaturations contained better inspiratory muscle strength, and less dyspnea and longer distance during the 6MWT than the others while the resaturations had greater FEV₁/FVC and smaller FRC than the other desaturations (all p<.05). In the cycling test, three patterns of saturation changed: mostly, desaturation (58%). The Δ SpO₂≥3% occurred at 68% of the cycling duration. The non-desaturations had better body mass index, OCD score, lung function, work of walking, and peak exercise performance (all p<.05). In both tests, the Δ SpO₂SN during the 6MWT was greater (p<.05) but the Δ SpO₂SE was similar (p=.79). The non-desaturations contained greater OCD scores (p<.01). Conclusions: Taking Δ SpO₂SN rather than taking Δ SpO₂SE during 6MWT is advocated. Exertional desaturation is related to demographics, lung function, and exercise performance. The OCD scores forecast desaturation in both tests.