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Title: Eccentric cycling exercise: A novel form of rehabilitation for patients with severe COPD?

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Body: During eccentric muscle contractions, greater levels of force are generated with lower metabolic cost, which can be an attractive alternate rehabilitation for severe COPD. The aim of this study is to estimate the extent to which eccentric compared to concentric training produces greater increases in isometric muscle force and fat free mass in patients with severe COPD. For this, a pilot randomized control trial was conducted in which 20 patients with COPD were randomly assigned to either high intensity concentric (CON, n=10) or eccentric (ECC, n=10) cycling training. Patients exercised 3 times per week, during 30 minutes and for the period of 10 weeks. Muscle biopsy was conducted in a subgroup of 12 patients (CON, n=06, ECC, n=06). Study participants were older subjects (age: 65 (5) years old) with severe COPD (FEV%pred: 40 (9) %predicted) and with significant muscle weakness (quadriceps force:103(10)NM). Significant increases in isometric quadriceps force were found in the ECC group (+18Nm, 17% increase from baseline; p <0.05), but not in the concentric (+9Nm, 5% increase from baseline; p >0.05). Fat-free mass index (kg/m²) increased post-training (17.4±1.7kg/m² to 17.6±1.7kg/m²) in the ECC group and decreased (18.5±2.7kg/m² to 18.2±2.8kg/m²) in the CON group (p<0.05). ECC cycling may be a valuable training modality for patients with advanced COPD due to its moderately greater augmenting effect on muscle strength and fat free mass than CON cycling, which may prove its relevance in preventing disease related muscle atrophy in patients with COPD. However, the clinical significant of these improvements remains to be shown.