

# Resistance training preserves skeletal muscle function in patients with COPD who are hospitalised with an acute exacerbation

## Synopsis

Summary of: Troosters T et al (2010) Resistance training prevents deterioration in quadriceps muscle function during acute exacerbations of chronic obstructive pulmonary disease. *Am J Respir Crit Care Med* 181: 1072–1077. [Prepared by Kylie Hill, CAP Editor.]

**Question:** In patients with chronic obstructive pulmonary disease (COPD), hospitalised with an acute exacerbation, does resistance training preserve quadriceps muscle force or change markers of systemic inflammation or muscle metabolism? **Design:** Randomised controlled trial with concealed allocation. Neither the investigators nor the participants were blinded to group allocation. **Setting:** Tertiary hospital in Leuven, Belgium. **Participants:** Key inclusion criteria were: people with COPD, hospitalised with an acute exacerbation, aged < 85 years, not hospitalised in the previous 14 days, not participating in a rehabilitation program, and no co-morbid conditions precluding participation in resistance training. Randomisation of 40 patients allocated equal numbers to the intervention and groups. **Interventions:** Both groups received standard doses of oral corticosteroids and physiotherapy limited to airway clearance techniques and breathing exercises. In addition, each day, the intervention group performed three sets of eight repetitions of quadriceps resistance exercise, at a load

set at 70% of the one repetition maximum. The load was progressed according to symptoms of dyspnoea and fatigue. Training sessions were supervised by physiotherapists. **Outcome measures:** The primary outcome was maximum isometric quadriceps force. Secondary outcomes included six-minute walk distance (6MWD) and serum concentrations of C-reactive protein, testosterone and insulin-like growth factor-1. In a sub-group of patients (n = 20), gene expression for anabolism and catabolism were obtained via biopsy of vastus lateralis. **Results:** Data were available on 36 patients at the time of hospital discharge. At discharge, the mean difference in the magnitude of change in quadriceps force in the intervention group relative to the control group was 10.7% (95% CI 0.9 to 20.7%). The intervention group demonstrated a predominant expression of anabolic markers, whereas the control group tended to demonstrate a predominance of catabolic markers. There were no other significant between-group differences. **Conclusion:** Resistance training for patients with COPD who were hospitalised for an exacerbation preserved quadriceps force without increasing biomarkers of systemic inflammation.

[Mean difference and 95% CIs calculated by the CAP Editor]

## Commentary

Atrophy and skeletal muscle dysfunction are usual consequences in chronic obstructive pulmonary disease (COPD), which jeopardize both exercise tolerance and survival (Maltais et al 2000). A sedentary lifestyle and repetitive exacerbations contribute to skeletal muscle dysfunction and to the dyspnoea/inactivity downward spiral in which COPD patients are engaged. After an acute exacerbation, muscle force and daily life activities are markedly reduced and functional recovery to previous levels may be long and difficult to achieve (Pitta et al 2006).

In this study from Troosters et al (2010), the authors show that resistance muscle training during exacerbation in COPD patients is feasible, prevents deterioration of skeletal muscle function, and may optimise exercise capacity without increasing harmful systemic inflammation. However, as no formal exercise therapy was offered to the control group, it is difficult to know whether resistance training offers additional benefit over and above usual clinical management, which includes early mobilisation. Nevertheless, early resistance training could be considered as a strategy to prevent muscle function deterioration, a major target for physiotherapists dealing with patients hospitalised for exacerbation of COPD.

Keeping a similar goal in mind, other strategies like neuromuscular electrical stimulation (Vivodtzev et al 2006) or bedside cycle ergometry (Burtin et al 2009) are also interventions likely to prevent or attenuate the decrease of muscle function in severe patients. This study provides physiotherapists with an additional strategy, which could be incorporated with interventions such as early mobilisation, to treat COPD patients' hospitalised with an exacerbation.

Whether resistance muscle training during acute exacerbation translates into maintenance of physical activity levels, long-term preservation of muscle function, exercise tolerance, and/or reduced readmission rates needs to be determined.

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## References

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