



# Exercise training in COPD: muscle O<sub>2</sub> transport plasticity

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**Patients with severe COPD exhibited attenuated plasticity in muscle convective oxygen transport, and therefore muscle  $V'_{O_{2peak}}$ , in response to exercise training that extended beyond simply disuse and would be expected to contribute to muscle dysfunction.** <https://bit.ly/38uAGfS>

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## Abstract

Both convective oxygen (O<sub>2</sub>) transport to, and diffusive transport within, skeletal muscle are markedly diminished in patients with COPD. However, it is unknown how these determinants of peak muscle O<sub>2</sub> uptake ( $V'_{mO_{2peak}}$ ) respond to exercise training in patients with COPD. Therefore, the purpose of this study was to assess the plasticity of skeletal muscle O<sub>2</sub> transport determinants of  $V'_{mO_{2peak}}$  in patients with COPD.

Adaptations to 8 weeks of single-leg knee-extensor exercise training were measured in eight patients with severe COPD (mean±SEM forced expiratory volume in 1 s (FEV<sub>1</sub>) 0.9±0.1 L) and eight healthy, well-matched controls. Femoral arterial and venous blood samples, and thermodilution-assessed leg blood flow were used to determine muscle O<sub>2</sub> transport and utilisation at maximal exercise pre- and post-training.

Training increased  $V'_{mO_{2peak}}$  in both COPD (by ~26% from 271±29 to 342±35 mL·min<sup>-1</sup>) and controls (by ~32% from 418±37 to 553±41 mL·min<sup>-1</sup>), restoring  $V'_{mO_{2peak}}$  in COPD to only ~80% of pre-training control  $V'_{mO_{2peak}}$ . Muscle diffusive O<sub>2</sub> transport increased similarly in both COPD (by ~38% from 6.6±0.9 to 9.1±0.9 mL·min<sup>-1</sup>·mmHg<sup>-1</sup>) and controls (by ~36% from 10.4±0.7 to 14.1±0.8 mL·min<sup>-1</sup>·mmHg<sup>-1</sup>), with the patients reaching ~90% of pre-training control values. In contrast, muscle convective O<sub>2</sub> transport increased significantly only in controls (by ~26% from 688±57 to 865±69 mL·min<sup>-1</sup>), leaving patients with COPD (438±45 versus 491±51 mL·min<sup>-1</sup>) at ~70% of pre-training control values.

While muscle diffusive O<sub>2</sub> transport in COPD was largely restored by exercise training,  $V'_{mO_{2peak}}$  remained constrained by limited plasticity in muscle convective O<sub>2</sub> transport.