

European Respiratory Society Annual Congress 2013

Abstract Number: 548

Publication Number: P5136

Abstract Group: 4.1. Clinical respiratory physiology, exercise and functional imaging

Keyword 1: Chronic disease **Keyword 2:** Rehabilitation **Keyword 3:** Ventilation/NIV

Title: Breathing patterns in healthy subjects during dynamic cycle ergometer eccentric exercise

Mr. Jean-Baptiste 5077 Lechauve jblechauve@gmail.com^{1,2,3}, Prof. Bernard 5078 Aguilaniu b.aguilaniu@me.com MD⁴, Dr. Marie-Eve 5079 Isner marie-eve.isner@chru-strasbourg.fr MD⁵, Mr. Vincent 5080 Martin vincent.martin@univ-bpclrmont.fr³, Prof. Dr Emmanuel 5081 Coudeyre ecoudeyre@chu-clermontferrand.fr MD² and Prof. Dr Ruddy 5083 Richard richard.ruddy@gmail.com MD¹.
¹ Sport Medicine and Functional Explorations, CHU, Clermont-Ferrand, France, 63000 ; ² Rehabilitation and Physical Medicine, CHU, Clermont-Ferrand, France, 63000 ; ³ Laboratory of Metabolic Adaptations To Exercise in Physiological and Pathological Conditions, Clermont University, Clermont-Ferrand, France, 63000 ; ⁴ HYLAB, HYLAB, Grenoble, France, 38000 and ⁵ Rehabilitation and Physical Medicine, Strasbourg University Rehabilitation Institute, Strasbourg, France .

Body: This study analyzed the breathing pattern of healthy subjects during eccentric (ECC) exercise. Eight active male volunteers (28 ± 6 years, 180 ± 5 cm and 71 ± 8 kg) performed two incremental maximal cycle ergometer exercise tests in concentric (CON) and ECC conditions. Metabolic adjustments (VO_2), breathing responses (ventilation VE ; tidal volume V_t ; breathing frequency fR) and electromyographic (EMG) activities of the vastus lateralis and biceps brachialis were measured and compared during ECC and CON exercise at the same mechanical power or VO_2 . At equal mechanical power (262.5 ± 32.0 W) VO_2 and VE were significantly lower in ECC than CON exercise (ECC/CON ratio 1/5; $p \leq 0.01$). At the same VO_2 (1904 ± 63 ml•min⁻¹ in CON and 1823 ± 231 ml•min⁻¹ in ECC), VE was comparable during CON and ECC exercise, whereas the breathing responses, but not blood oxygenation, were significantly different (V_t : 2.07 ± 0.27 l CON vs. 1.35 ± 0.35 l ECC, $p < 0.01$; fR : 26.4 ± 3.7 breath•min⁻¹ CON vs. 36.1 ± 10.4 breath•min⁻¹ ECC, $p < 0.05$). EMG activities were similar for the vastus lateralis, but higher for the biceps brachialis in ECC than CON conditions (32.4 ± 9.6 μV vs. 12.5 ± 5.2 μV , $p < 0.01$). Changes in the ECC breathing pattern might be related to chest expansion limitations imposed by the subjects' position on the cycle ergometer, as suggested by the higher biceps brachialis EMG activity. These changes may cause dynamic hyperinflation, which should be taken into account when designing rehabilitation programs.