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Title: Exposure to hypercapnia and muscle function

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Body: Hypercapnia has been purposed among the systemic factors participating in muscle dysfunction occurring in COPD. Aim: To assess the effects of acute and chronic exposure to bouts of hypercapnia on peripheral and respiratory muscle function. Methods: Two subgroups of 8 Wistar rats each were submitted to either a hypercapnic gas mixture ($FICO_2$ 0.5) or room air, 2 h/d for 15 days. Maximal inspiratory pressure (MIP), lower limb dynamometry (LLD), breathing pattern, work of breathing, P0.1 and arterial blood gases were determined at the beginning and at the end of each exposure. Results: Acute exposure to hypercapnia (1^{st} single bout) did not involve changes in muscle function. However, chronic exposure to hypercapnic bouts resulted in a lower weight gain, and a decrease in both MIP (% ref) and LLD (% ref) in hypercapnic animals when compared with controls. Interestingly, acute exposure to hypercapnia in the last (15^{th}) day also involved a decrease in both MIP and LLD. Acute hypercapnia resulted in increases in respiratory rate (RR) but minute ventilation (VE) and P0.1 remained constant. Chronic exposure to hypercapnic bouts did not change breathing pattern nor ventilatory drive. Conclusions: Although a single acute exposure to hypercapnia did not induce changes in muscle function, repeated exposures resulted in both a loss in muscle strength and an increase in susceptibility to a further impairment with new hypercapnic bouts. The similar behavior of respiratory and limb muscle strength, both normalized by rat anthropometry, indicates that the loss of force is the result of hypercapnia and not a consequence of either the increase in ventilatory work or the decrease in weight gain. Supported by ERS short fellowship, SEPAR and J.Gras Grants.