Persistent Elevation of Vascular Endothelial Growth Factor and Prostacyclin Following Cardiopulmonary Maladaptation to High Altitude: A Pilot Study

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Background: Exposure to hypobaric hypoxemia causes acute mountain sickness (AMS) in 40% of subjects acutely exposed to an altitude of 4,000 m. Vascular endothelial growth factor (VEGF) and cytokines appear to play a role in AMS in model systems. The objective of this pilot study was to explore the change in VEGF, the vasodilatory prostacyclin PGI-2, interleukin-6 and thiobarbituric acid reactive substances (TBARS) levels following prolonged exposure to hypobaric hypoxemia on Bolivian Altiplano. The secondary objective was to investigate the relationship between these markers with good versus poor adaptation to high altitude.

Methods: The study population consisted of 7 climbers aged 24-64 yr. One cardiac transplant and one kidney transplant recipients participated in this study. Aerobic capacity was assessed on a treadmill using a RAMP protocol with gas exchange analyses. Blood samples were harvested within 48 hr of departure and within 24 hr returning to sea level.

Results: Selected biochemistry parameters are presented in the table:

	VEGF (pg/mL)		PGI-2 (pg/mL)		Il-6 (pg/ mL)	
	Pre	Post	Pre	Post	Pre	Post
No-AMS* (n=5)	232 ± 54	251 ± 81	48.7 ±39.2	77.6 ±60.9	14.9 ±11.7	14.8 ±14.1
AMS-brain† (n=1)	259	244	85.4	62.0	40.3	51.9
AMS-CP‡ (n=1)	222	553	118	311	11.3	13.7

Data are mean ±SD. CP= cardiopulmonary. Both cardiac and Tx recipients did not experience AMS. Maximum altitude achieved: *6120-6522; †5680; ‡5300 meters.

Conclusions: Pulmonary maladaptation to high altitude results in a 2-fold elevated VEGF and PGI-2 without concomitant increase of markers of inflammation or oxidative stress. VEGF does not appear to increase in cerebral maladaptation to high altitude. Further investigations are needed to better understand the role of VEGF and other biomarkers during the process of adaptation or maladaptation to high altitude.

Sexuality and Chronic Respiratory Disease

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Background: At the admission in rehabilitation program, some patients with chronic respiratory disease were asked by a health professional to answer a questionnaire about their sexuality. The objectives of the study were 1) to determine if sexual problems occurred in patients with respiratory chronic disease ; 2) to assess if these survey problems were linked to respiratory disease; 3) to explore the motivation to speak about sexuality during rehabilitation program.

Methods: 52 consecutive respiratory disease subjects (58.3 ± 9 yr; $FEV_1 = 65.5 \pm 21$ % predicted, mean ± SD) answered a sexuality questionnaire survey with rehabilitation team (psychologists, nurses, physiotherapists). This group comprised 26 men and 26 women.

Results: 70% of patients estimated that respiratory disease had an impact on their sexuality. A visual analog scale showed that 62% of patients were not satisfied. The severity of obstruction (FEV_1) was not correlated to satisfaction ($r=.017$, $P=0.90$), or frequency ($r=.08$, $P=0.55$). Breathlessness was the most important factor of discomfort in sexual activity (61.5%). Tiredness and cough came second (32% and 21% re-

spectively). 63% of respiratory patients never spoke about their sexuality with a health professional. 60% would like the health professional to begin to talk about their sexuality. 36% of patients spoke about it with a professional. In this group, 94% of patients told the professional about their sexual activity on their own initiative.

Conclusion: More than one of two chronic respiratory disease patients (77%) participating in a rehabilitation program want sexuality to be taken into consideration during their program.

Fatigability of Lower Limb Muscles during Walking in Chronic Obstructive Pulmonary Disease

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Background: Patients with chronic obstructive pulmonary disease (COPD) perceive much less quadriceps fatigue during walking compare to cycling. Whether other lower limb muscles could develop fatigue during walking is unknown. The purpose of this study was to assess the electrical activity of five lower limb muscles during a 6-minute walking test in 11 healthy subjects and in 10 patients with COPD matched for age and activity level.

Methods: Surface electromyographic (EMG) data were recorded in five muscle groups (soleus, gastrocnemius (GM), tibialis anterior, vastus lateralis and rectus femoris) of the right leg during the walking test. The EMG median frequency of all contractions at minute 2 and 6 were averaged for each muscle group. Ventilation, oxygen consumption and CO₂ production were also continuously measured throughout the test.

Results: Although the walking distance (494 ± 116 vs. 625 ± 50 m; $P < 0.01$) and the walking speed (1.7 ± 0.4 vs. 2.1 ± 1.2 m·s⁻¹; $P < 0.01$) were reduced in COPD compared with controls, patients worked at a higher percentage of their estimated maximum voluntary ventilation during the test (118 ± 32 % vs. 51 ± 14 %; $P < 0.01$). The time course of the EMG median frequency from minute 2 to 6 differed between patients with COPD and healthy controls for the soleus, GM and tibialis anterior suggesting the occurrence of a muscle fatiguing profile in COPD.

Conclusions: Evidences of a fatiguing profile was found in three lower limb muscle groups during walking in COPD despite a slower walking speed compared to healthy controls.

Pulmonary Rehabilitation Results in Significant Effect on Physical Outcomes: Preliminary Data from the Saint John Regional Hospital, New Brunswick, Canada

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Background: Current guidelines claim that pulmonary rehabilitation is a cost effective method for increasing exercise tolerance, decreasing hospitalization, and improving knowledge and quality of life in patients with chronic obstructive pulmonary disease. The purpose of the present study was to examine the changes in physical and psychological outcomes during and after completion of a pulmonary program.

Methods: Between September 2004 and April 2006, 27 patients attended pulmonary rehabilitation. All patients were referred by a Respiriologist and had moderate to severe respiratory impairment on pulmonary function testing. They attended 3 supervised exercise sessions per week for 10 weeks under the supervision of a nurse and physiotherapist. Education modules were provided by the physiotherapist and respiratory therapist to increase knowledge and independence with disease