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Cerebral cortex blood flow response to exercise in COPD patients with and without cognitive impairmentVasileios Andrianopoulos¹, Ioannis Vogiatzis², Rainer Gloeck^{1,3}, Robert Bals⁴ and Klaus Kenn^{1,5}¹Schoen Klinik Berchtesgadener Land, Germany²National and Kapodistrian University of Athens, Greece³Technical University of Munich, Germany⁴University Clinic of Saarland, Homburg, Germany⁵University of Marburg, Germany

Background: Cognitive impairment (CI) is a prevalent extrapulmonary manifestation in COPD. Potential disturbances in cerebral circulation and oxygen delivery due to reduced ventilatory efficiency and ventilatory drive may be associated with higher rates of CI. We assessed cerebral tissue oxygen index (TOI) and cerebral hemodynamics at exertion in COPD patient with and without CI.

Method: 52 COPD patients (aged 68±8yrs; FEV1: 45±14%; 40% women) underwent a comprehensive cognitive assessment. Patients were assigned to “CI” and “non-CI” groups according to Montreal Cognitive Assessment (MoCA) cutoff score ≤25points. Patients performed cycle endurance test (CET) at 75% of peak work rate while transcutaneous carbon-dioxide partial-pressure ($t_{TC}PCO_2$), cerebral tissue oxygen index (TOI) and cerebral hemoglobin responses were recorded by SenTec and Portalite systems, respectively.

Results: 23 patients (44%) presented evidences of CI (MoCA≤25) with also lower scores in other cognitive tests (all $p < 0.001$). A correlation between $t_{TC}PCO_2$ and cerebral oxygenated hemoglobin (O_2Hb), and total hemoglobin (tHb) at the end of CET was detected ($r: 0.34, p=0.021$; $r: 0.34 p=0.023$, respectively). Oxygen saturation (SpO_2) at the end of CET was not related with cerebral deoxygenated hemoglobin (HHb) and tHb. Patient with CI developed similar cerebral hemodynamic pattern and TOI compared to non-CI during CET.

Conclusion: COPD patients have the capacity to autoregulate cerebral cortex blood flow in response to hypercapnia and hypoxemia, at least during exercise, and thus to normalize cerebral tissue oxygenation. These findings suggest that exercise is safe and can be beneficial regarding cognitive function in COPD.

Biography

Vasileios Andrianopoulos is a Clinical Exercise Physiologist, working as Postdoctoral Research Fellow at Schoen Klinik Berchtesgadener Land, Germany. He has his expertise in COPD pathophysiology, clinical exercise assessment and pulmonary rehabilitation programs for COPD patients. Devoting himself to research, he acquired experience in designing research protocols, analyzing data and writing manuscripts as well as in operating several clinical devices. He has numerous publications in healthy individuals and patients with COPD, and since 2014 is an active member of the European Respiratory Society (ERS) College of Experts. Recently (2016), he has been awarded with a prestigious Marie Skłodowska-Curie fellowship cofounded by the European Union and the European Respiratory Society (ERS) for his project about cognitive dysfunction in COPD.

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