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## Neglected mechanisms of cardiopulmonary capacity in health and heart failure- Why brain and heat stress really matter?

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Physical capacity is a complex process and may be subject to significant modulation due to intensity of aerobic and anaerobic processes, efficacy of thermoregulation, psychomotor performance and psychological factors irrespective of normal functioning of the cardiovascular and musculoskeletal systems. Hence, the dynamics and magnitude of changes in core body temperature in response to acute physical exercise in cardiopulmonary exercise test (CPX) and their relationship to exercise capacity have not been elucidated yet. The role of the cortical centers in modulation of fatigue perception in physically active people is also controversial. The cerebral cortex is a significant determinant of psychomotor performance. The results of the study confirmed a significant relationship between core body temperature at maximal physical effort ( $T_c$ ) in CPX and psychomotor performance in healthy amateur athletes. The psychomotor performance was also related to carbon dioxide output at maximal physical exercise, ventilatory equivalent for carbon dioxide at the anaerobic threshold. Thermo-metabolic ( $VO_{2AT}$  divided by  $T_c$ ) and neurothermo-metabolic ( $VO_{2AT}$  divided by the sum of  $T_c$  and psychomotor performance score) index are strongly related to parameters of exercise capacity as measured at maximal physical effort during CPX (VE,  $VCO_2$ ). The Rate of Perceived Exertion (Borg scale) immediately after CPX, is not related to  $T_c$ , exercise capacity parameters and psychomotor skills. The magnitude of changes in core body temperature during CPX may affect the parameters of physical fitness through modulation of psychomotor skills. Psycho-motor performance influences ventilator parameters. Subjective perception of physical effort does not correlate with exercise capacity parameters in CPX.

### Biography

Robert Skalik, MD, PhD is a consultant in cardiology, exercise physiologist. He completed his PhD in echocardiography from Medical University of Wrocław. He covered internship in the Department of Cardiology at Free University of Amsterdam, the Netherlands. He is a lecturer in Post-graduate School of Cardiology, University of Perugia and an academic teacher and researcher in Department of Physiology, former consultant in cardiology in Department of Cardiac Surgery and Cardiology, Medical University of Wrocław, former Head of Department of Cardiac Rehabilitation, Wrocław, private practice in cardiology, Wrocław, research projects evaluator for EU. He has published 103 papers on cardiology and human physiology.

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