Cerebral oxygenation, exercise capacity, cardiac output and cognitive performance in patients with coronary heart disease

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Keywords: Coronary heart disease; Cognition; Cerebral oxygenation; Physical capacity

Objectives.– Recent data suggested that coronary heart disease (CHD) was associated with non-amnesic mild cognitive impairment. The purpose of our study was to assess cognitive performances at rest, VO2max, cardiac output, and cerebral hemodynamic changes during maximal exercise in patients with stable CHD.

Methods.– Twenty stable fit CHD patients (70.8 ± 9.1 years), 10 healthy age-matched (70.5 ± 8.8 years), 10 middle aged controls and 10 young controls (< 40 ans) were included. We assessed cognitive performance with a standard battery of pen and paper tests, maximal exercise test on ergocycle with gas exchange analysis with non-invasive cardiac output measurement and Near-Infrared Spectroscopy (NIRS) oxygenation indices at the brain level.

Results.– There was no intergroup difference in VO2max or maximal cardiac output between cardiac and healthy age-matched individuals. Some cognitive tests, especially for executive functioning, were significantly better for the healthy matched group (Trail Making Test-B; Inhibition/Flexibility Stroop Task and Backward Digit Span, P < 0.05). For NIRS signals, we observed an increase in deoxyhemoglobin (HHb) for maximal intensities and the classical inverted U-shaped curves for oxyhemoglobin (O2Hb) and hemoglobin difference (Diff Hb = O2Hb - HHb) in each group. Between cardiac and healthy matched subjects, only the HHb parameter had significant higher changes for maximal intensities. About fitness, intra-CHD group differences were observed with higher amplitudes in NIRS changes for fit CHD subjects. In control groups, middle aged and young subjects had significant higher performances in VO2max, most of cognitive tests associated with higher amplitudes changes for NIRS indices while exercising.

Conclusion.– In spite of comparable maximal exercise tolerances and cardiac outputs, CHD individuals presented some reduced cognitive performances with an inter-individual variability of cerebral NIRS signals changes especially with age and fitness.

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Effects of a 4-month high-intensity interval training associated with resistance training program on cognitive performance, cerebral oxygenation, exercise capacity and cardiac output in middle-aged overweight subjects


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Keywords: Overweight; Exercise; Interval training; Cognition; Cerebral oxygenation

Objectives.– Many interventional studies have reported the benefits of regular physical activity on cognitive aging, even more when different exercise modalities were combined. The purpose of our study was to assess the effects of a training intervention combining high-intensity interval training and resistance training on anthropometric data, exercise tolerance, cognitive performance and cerebral oxygenation during exercise in overweight adults.

Methods.– Six adults (4 males) (49.4 ± 8.7 years; BMI: 29.4 ± 1.4 kg/m²) performed a 4-month training program including 2 high-intensity interval training (HIIT) sessions on ergocycle, and 2 resistance training sessions per