RELATIONSHIPS BETWEEN HDL FUNCTIONAL CHARACTERISTICS AND ENDOTHELIAL VASCULAR FUNCTION AFTER SHORT-TERM EXERCISE TRAINING IN PATIENTS WITH THE METABOLIC SYNDROME

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Introduction: Endothelial dysfunction, leading to vasodilation impairment and atherosclerosis, frequently affects patients with metabolic syndrome (MS). A recent study showed that HDL stimulates endothelial nitric oxide synthase (eNOS: a key regulator of vascular nitric oxide production) by activation of Akt and MAP kinases in cultured endothelial cells.

Objectives: To investigate the relationships between HDL characteristics (concentration, composition, functionality) on the eNOS availability and endothelial vascular function in patients with MS after a short-term exercise training (T).

Methods: Forty sedentary persons (30 MS and 10 controls) were studied. Twenty with MS were subjected to a 3 times/week of a training load (45min/d) for 3 months on a bicycle. Cyclic guanosine monophosphate (cGMP), blood nitrite concentrations (biomarkers of eNOS availability) and HDL subfractions obtained by plasma ultracentrifugation were analyzed. A control LDL was incubated with HDL subfractions from the patients with MS (before-after T) and the in vitro resistance to oxidation was verified. An artificial radio-labeled lipoprotein emulsion was incubated with plasma from the participants. After precipitation of VLDL and LDL, the HDL containing supernatant was counted for radioactivity, to verify the HDL ability to accept lipids. Endothelial vascular function was assessed from forearm blood flow-mediated responses to vasodilation tests (FMD).

Results: T did not change HDL-C concentration but changed the molecular composition and improved the functional characteristics of the HDL-particles subfractions: protecting LDL against oxidation (+21%) and increasing the HDL-particles ability to accept lipids (+23%). T increased cGMP and blood nitrite concentrations. The best HDL functional results were associated with the highest cGMP and blood nitrite concentrations and with the best FMD improvement results in the MS group.

Conclusions: T early changes functional characteristics of HDL-particles, rather than HDL-C concentration, associated with eNOS biomarkers and with endothelial vascular function improvement in patients with MS, highlighting the early vascular benefits of exercising.