i.e., L-arginine (L-arg), asymmetric dimethylarginine (ADMA), their metabolites, and the L-arg/ADMA ratio and their impact on running economy (RE) in runners. Thus, 26 male amateur endurance runners completed a 12-week study in which they were divided into two supplemented groups: the OMEGA group ($n=14$; 2234 and 916 mg of eicosapentaenoic and docosahexaenoic acid daily) or the MCT group ($n=12$; 4000 mg of medium-chain triglycerides daily). At the same time, all participants followed an endurance training program. Before and after the 12-week intervention, blood was collected from participants at two time points (at rest and immediately post-exercise) to determine EPA and DHA in red blood cells (RBCs) and plasma levels of L-arg, ADMA, and their metabolites. RBC EPA and DHA significantly increased in the OMEGA group ($p<0.001$), which was related to the resting increase in L-arg ($p=0.001$) and in the L-arg/ADMA ratio ($p=0.005$) with no changes in the MCT group. No differences were found in post-exercise amino acid levels. A total of 12 weeks of omega-3 fatty acid supplementation at a dose of 2234 mg of EPA and 916 mg of DHA daily increased levels of L-arg and the L-arg/ADMA ratio, which indirectly indicates increased bioavailability/NO synthesis. However, these changes were not associated with improved RE in male amateur endurance runners.

Circulating levels of IL-8 and MCP-1 following acute aerobic exercise and their association with energy metabolism in healthy adults

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Abstract

Introduction: Recent WHO recommendations emphasize the benefits of short-term exercises on physical activity level, cognitive performance, and various health outcomes. As the evidence shows that daily physical activity in many people is composed of short bursts of moderate to vigorous exercises lasting a few minutes, in our study we examined how 10-min walking and running exercises affected circulation levels of inflammatory mediators IL-8 and MCP-1.

Methods: Serum IL-8 and MCP-1 concentrations for 72 healthy adults were determined before and after the 10-min treadmill exercise, and the association with the metabolic rate at rest and exercise obtained in indirect calorimetry was investigated.

Results: Pre-exercise mean levels of IL-8 and MCP-1 in men and women were 6.8 and 5.9 pg/mL and 438.4 and 381.6 pg/mL, respectively. A slight increase in IL-8 was detected in 68% of participants, and a decrease in the post-exercise level of MCP-1 was detected in 74% of participants. Men in whom an increase in IL-8 after exercise was observed had 8.3% greater energy expenditure in walking than those whose IL-8 decreased after the exercise. Women who had increased MCP-1 due to exercise had a 9.8% lower resting metabolic rate and 4.7% lower running energy expenditure than women whose MCP-1 decreased after the exercise.

Conclusions: Acute aerobic exercise led to an increase in IL-8 and a decrease in MCP-1 in most participants. In response to the exercise, there were differences between both sexes in the chemokine secretion changes and their associations with the values of metabolic parameters.

The VO_2 slow component at different exercise intensities and domains: Association with markers of metabolic instability and muscle activation

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Abstract

In heavy and severe-intensity exercise, metabolic instability (deoxyhaemoglobin, [HHb]) and increased muscle activation (EMG) were described in association with the slow component of oxygen consumption ($\dot{V}O_{2sc}$). With the aim to confirm these observations within and between domains, we tested the hypothesis that metabolic instability and muscle activation: (i) are affected by time and intensity and (ii) both contribute to the $\dot{V}O_{2sc}$. Eleven active men performed a total of six, 9-min constant work exercises at different absolute intensities: 2 in Moderate (>$\dot{V}O_2$rest/GET; M_1, M_2), 2 in Heavy (>GET/<RCP; H_1, H_2) and 2 in Severe (>RCP/<$\dot{V}O_{2max}$; S_1, S_2) domains. $\dot{V}O_2$, [HHb], root mean square by EMG (RMS) were measured and compared by 2-way RM-ANOVAs (time×intensity). The slope between 3rd and 9th min linear-fitting of [HHb] and RMS were calculated and the relationship with $\dot{V}O_{2sc}$ evaluated by simple and multiple linear regressions. $\dot{V}O_2$, [HHb] and RMS increased significantly as an interaction effect of time×intensity ($p<0.05$, for all comparisons). Beyond the 3rd min, $\dot{V}O_2$ and [HHb] increased significantly over time in heavy and severe intensities ($p<0.01$ for all comparisons); RMS, on the contrary, only increased over time in S_2 ($p<0.001$). VO_{2sc} was significantly correlated with the slope of [HHb] ($r=0.48$ $p<0.001$) and RMS ($r=0.58$, $p<0.001$) and both were significant predictors of the $\dot{V}O_{2sc}$ ($r=0.612$; SSE 0.016 mL/min^2, $p<0.001$). We confirmed the contribution of both metabolic instability and muscle activation to the dynamic of the VO_{2sc} across different exercise intensities.