TACSM Abstract

Responses of Matrix Metalloproteinases in Obese Men after Undergoing Low and High Intensity Exercise

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ABSTRACT

Matrix metalloproteinases (MMPs) are zinc-dependent endopeptidases that degrade extracellular matrix proteins and play a role in various pathological conditions such as inflammation and endothelial dysfunction. PURPOSE: The current study investigated the responses of MMP-1, -2, and -9 in obese men over a 24-hour period after undergoing different intensities (low vs. high) of cycling exercise. METHODS: Fifteen sedentary (physical activity < 2 days/week) obese [body mass index (BMI) > 30kg/m²] men between the ages of 18 and 30 years participated in the study. Each participant completed a similar volume (average energy expenditure ~ 300 kcal) of cycling exercise at 2 different intensities in random order [low-intensity: 50% of maximal heart rate and high-intensity: 80% of maximal heart rate] on a separate occasion. Fasting overnight blood samples were collected at baseline, immediate post exercise (IPE), 1-hour post exercise (1-PE), and 24-hours post exercise (24-PE) for each exercise intensity trial to examine the responses of MMP-1, -2, and -9. An analysis of variance (ANOVA) with repeated measures was used to determine the mean differences in intensity and time on MMP-1, -2, and -9. If necessary, the Sidak's multiple pairwise comparisons and a follow-up Simple effects test were employed as a post-hoc test (p < 0.05).

RESULTS: No change was found in MMP-1 following either low- or high-intensity exercise over the 24-hr period. During the low-intensity exercise trial, MMP-2 at 24-hr PE (72.68±6.43 ng/mL, p=0.008) and 1-hr PE (92.01±7.99 ng/mL, p=0.011). During the high-intensity exercise trial, MMP-9 at IPE (54.19±9.16 ng/mL) was significantly higher than PRE (30.48±5.86 ng/mL, p=0.008), 1-hr PE (34.82±5.08 ng/mL, p=0.040), and 24-hr PE (31.03±4.82 ng/mL, p=0.006). Additionally, MMP-9 at 24-hr PE (31.32±4.82 ng/mL, p=0.009) during the low-intensity exercise trial. CONCLUSION: Both MMP-2 and -9, but not MMP-1, significantly increased immediately following exercise, which then returned to its baseline values post exercise. This exercise-induced acute change in MMP-2 and MMP-9 was dependent upon exercise intensity since MMP-2 changed with low-intensity exercise, whereas MMP-9 was altered following high-intensity exercise. Additionally, MMP-9 at 24 hours decreased after 24 hours following low-intensity exercise. Thus, the current study suggests that the responses of MMP-2 and MMP-9 to exercise are dependent on exercise-intensity, and low-intensity exercise may favorably influence cardiovascular health by lowering both MMP-2 and MMP-9 in obese men.