

## 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/m<sup>2</sup>] 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-hot 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 ( $72.68 \pm 6.43$  ng/mL) was significantly lower than IPE ( $87.23 \pm 8.02$  ng/mL,  $p=0.008$ ) and 1-hr PE ( $92.01 \pm 7.99$  ng/mL,  $p=0.011$ ). During the high-intensity exercise trial, MMP-9 at IPE ( $54.19 \pm 9.16$  ng/mL) was significantly higher than PRE ( $30.48 \pm 5.86$  ng/mL,  $p = 0.008$ ), 1-hr PE ( $34.82 \pm 5.08$  ng/mL,  $p=0.040$ ), and 24-hr PE ( $31.03 \pm 4.82$  ng/mL,  $p=0.006$ ). Additionally, MMP-9 at 24-hr PE ( $31.32 \pm 4.82$  ng/mL) was significantly lower than PRE ( $41.43 \pm 5.86$  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.

