GO2 RESULTS REPORT

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HOUSTON Methodist ORTHOPEDICS & SPORTS MEDICINE

COMPARISON OF GO2 TO CONTROL MOUTH PIECE & NO MOUTHPIECE

Protocol 1 (GXT): Graded exercise cycling test beginning at a workload of 150watts following unloaded 3minute warm-up. During the test, stages progressed with increasing workloads of 30 Watts every two minutes until the participant could no longer maintain within 10rpms of their self selected pedal cadence. Gas collection was continuously collected and measurements of hemodynamics, heart rate, and perceived exertion were recorded every two minutes during exercise and at 1, 3, and 5 minutes of unloaded recovery at the same self selected pedal cadence.

Protocol 2 (SSXT): Steady state exercise testing set at a workload equivalent to measured anaerobic/ventilator threshold assessed during GXT testing. Following an unloaded 3 minute warm-up, participants maintained a constant pace until exhaustion. Gas collection was continuously collected and measurements of hemodynamics, heart rate, and perceived exertion were recorded every two minutes during exercise and at 1, 3, and 5 minutes of recovery.

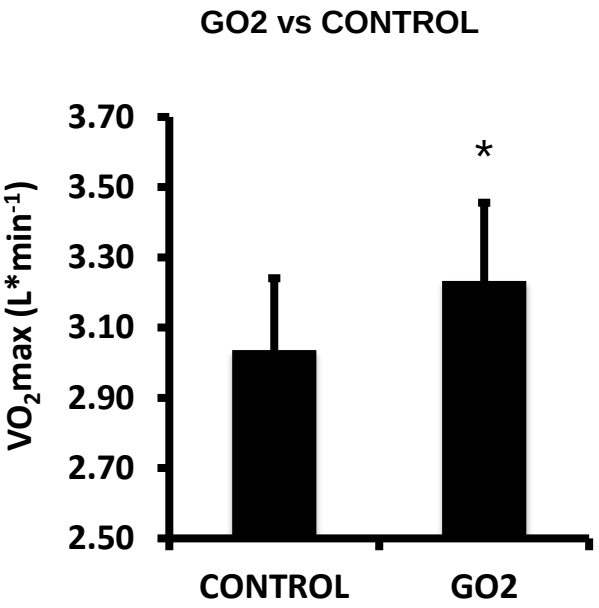
Comparisons: GO2 vs CONTROL MOUTHPIECE (Battle), GO2 vs NO-MOUTHPIECE, GO2 vs COMBINED CONTROLS

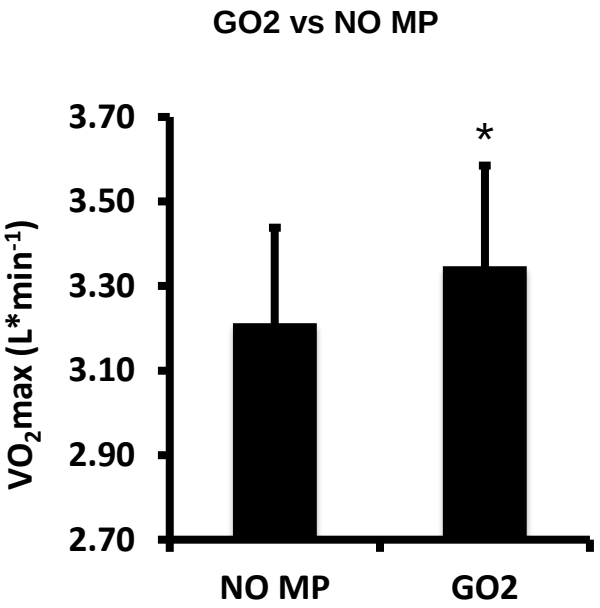
Analysis: Data were compared at each stage of exercise and each time-point during recovery using a two-tailed paired samples t-test. To account for potential wide variance in the participant population with regards to aerobic fitness and training history, a mixed model analysis of covariance (ANCOVA) was used where values were co-varied on measures taken with the control mouthpiece. FIGURES and CONCLUSIONS are presented for both types of analyses in this report. NOTE: Conclusions presented in this document represent statistical findings and are not intended to the potential physiologic mechanisms responsible.

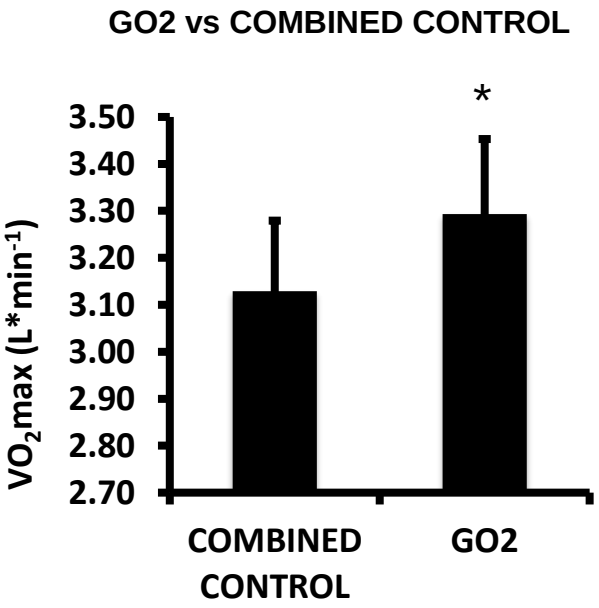
Figures: Figures presented here are for data whereby at least one significant measurement was detected.

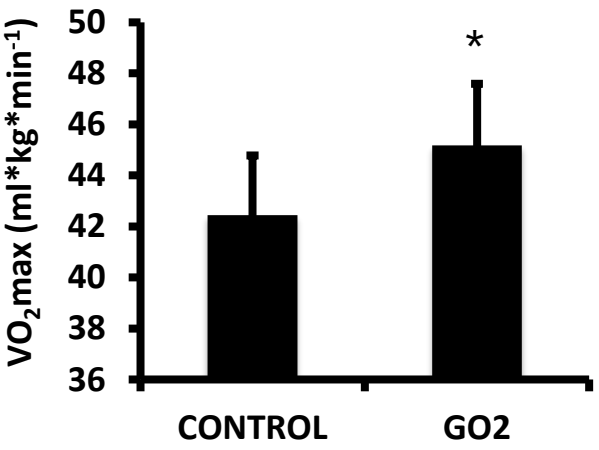
OBRL – GO2 Project Results Summary (VO_2max)

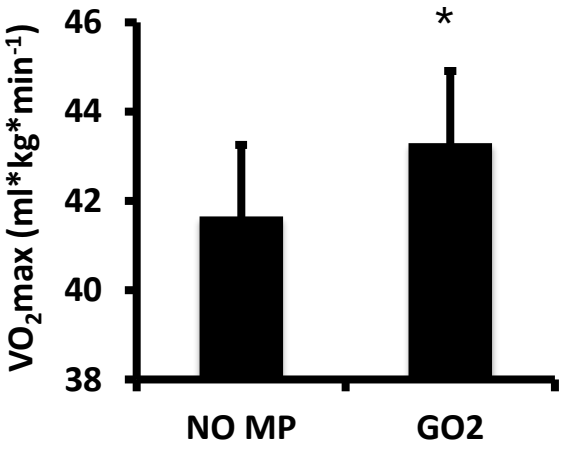
KEY: Data are presented as means ± standard error for VO2max expressed as both absolute (LO_2*min^{-1}) and and relative ($mlO_2*kg*min^{-1}$) units. *=Significantly Different at $p<0.05$.

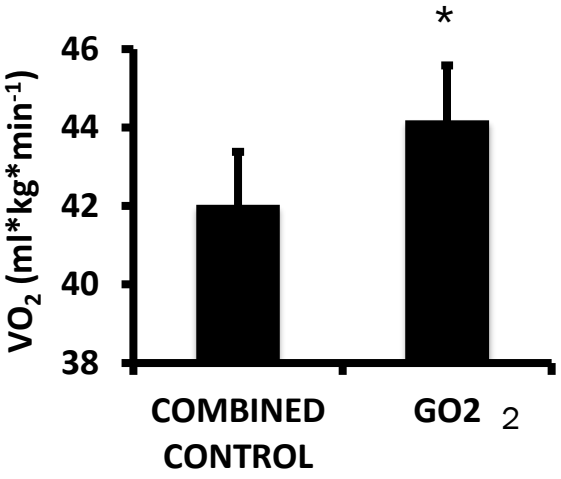






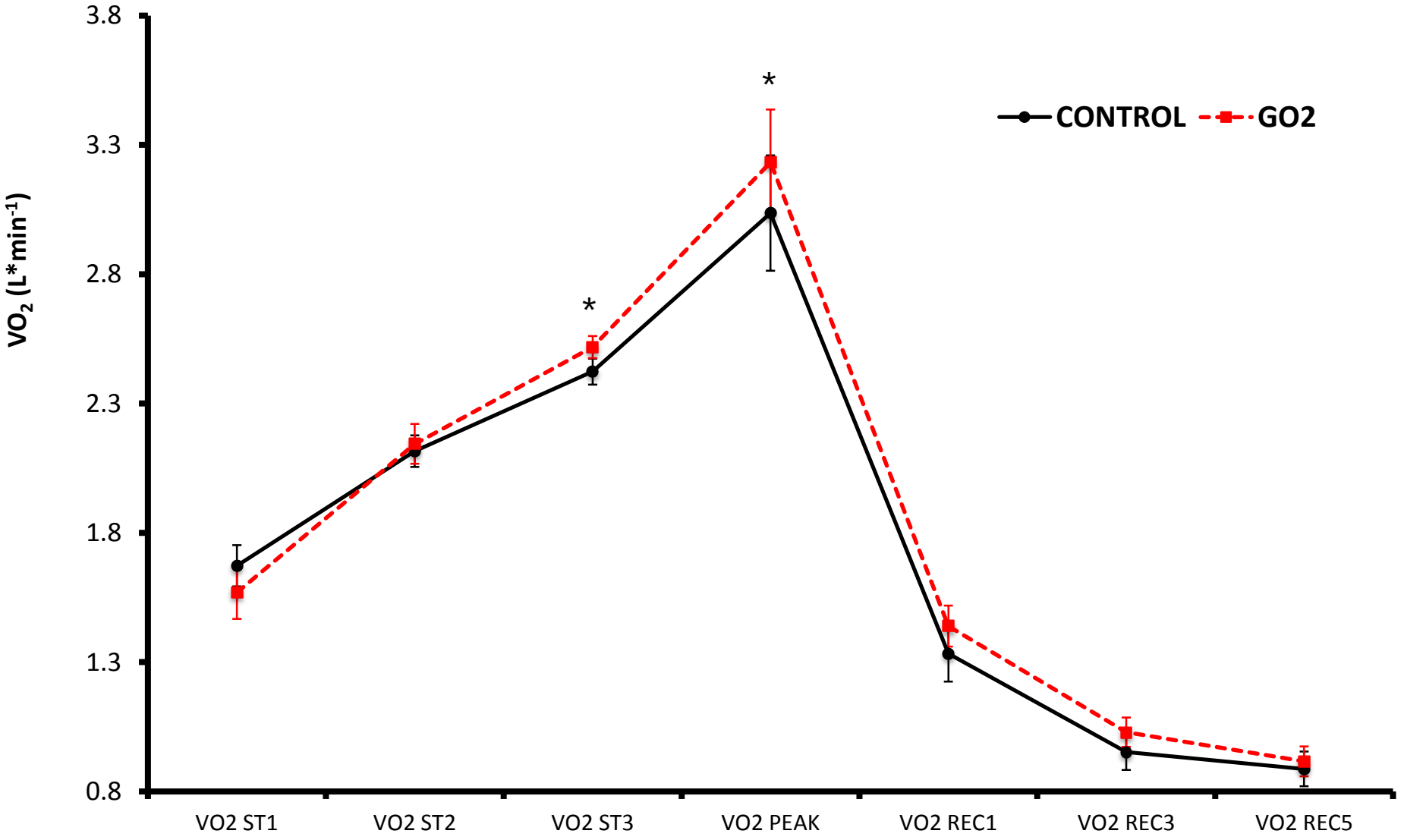






OBRL – GO2 Project Results Summary (VO_2 L*min^{-1})

KEY: Data are presented as means ± standard error for VO2 (L/min) measured during graded exercise cycle testing. * = Significant difference between conditions (Control / GO2) at the same measurement time-point (p<0.05)



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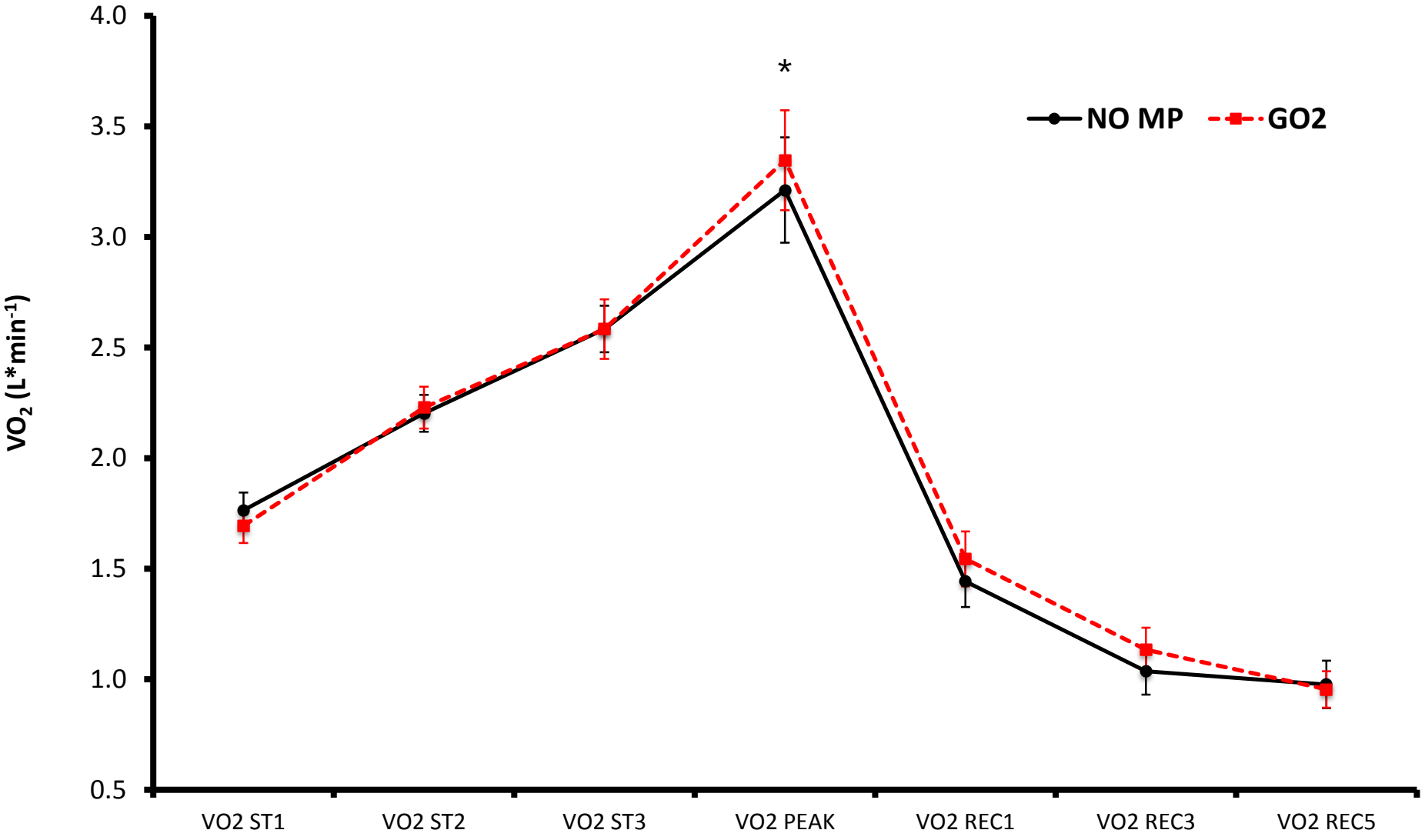

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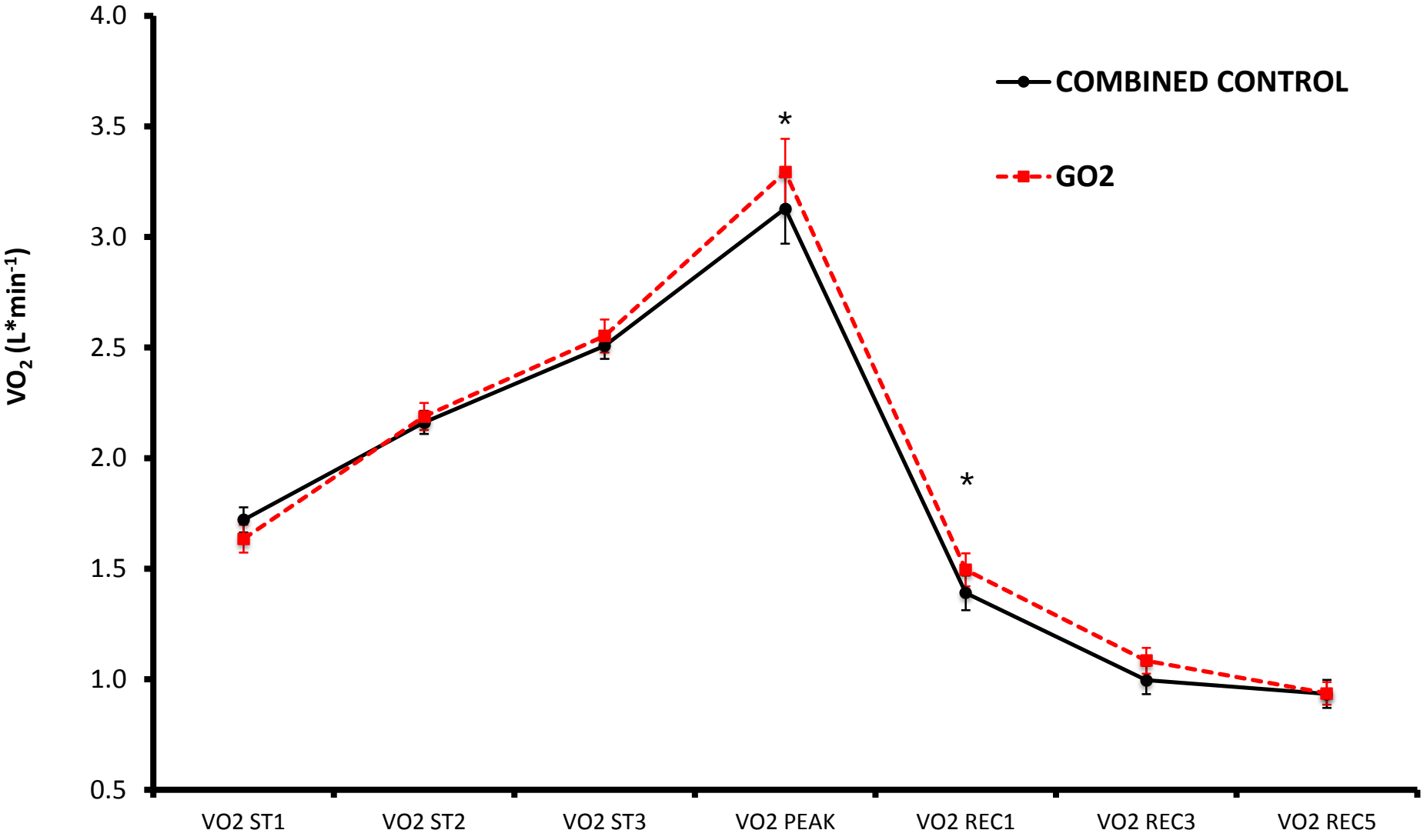

OBRL – GO2 Project Results Summary (VO_2 ml*kg*min^{-1})

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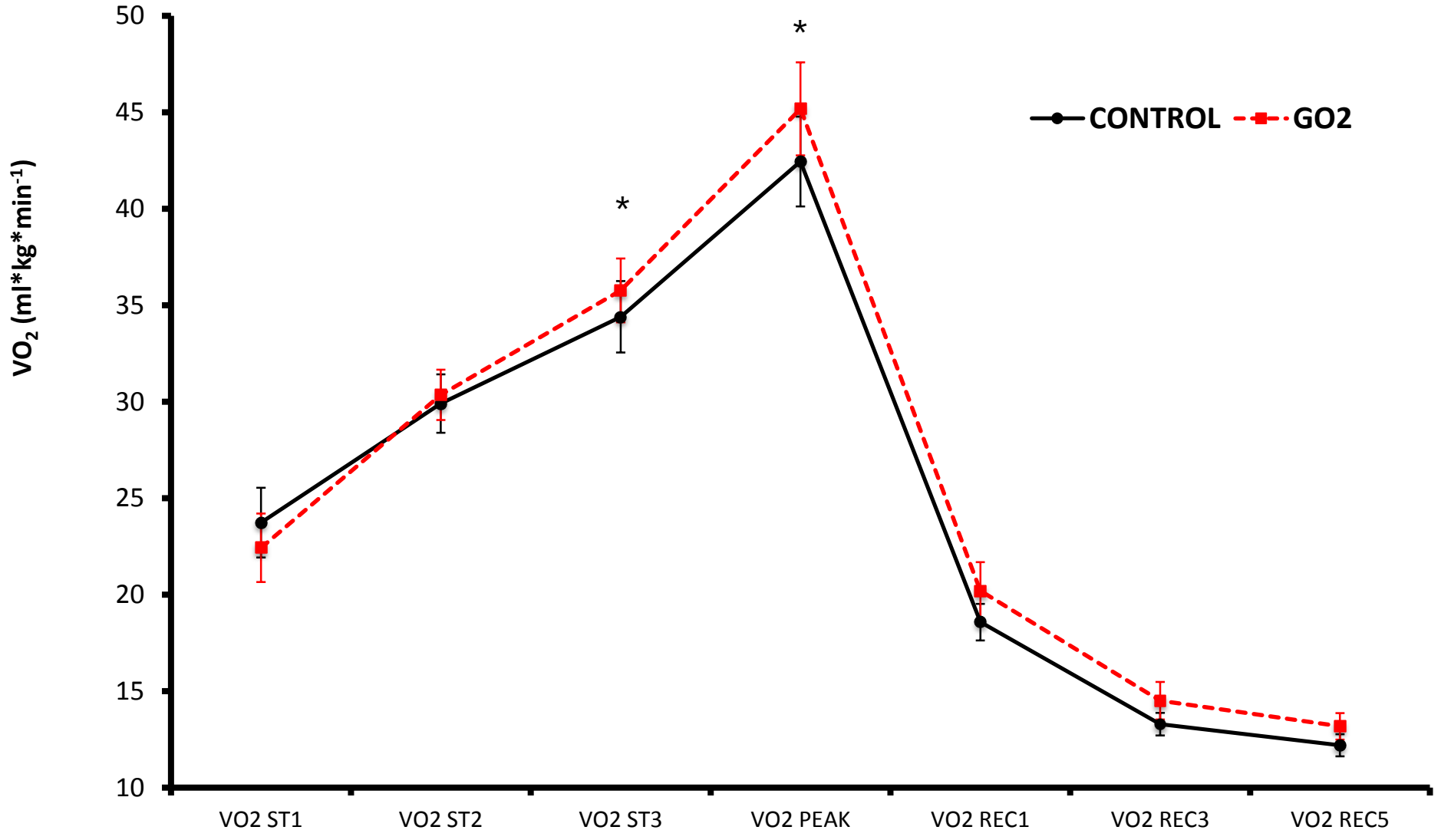

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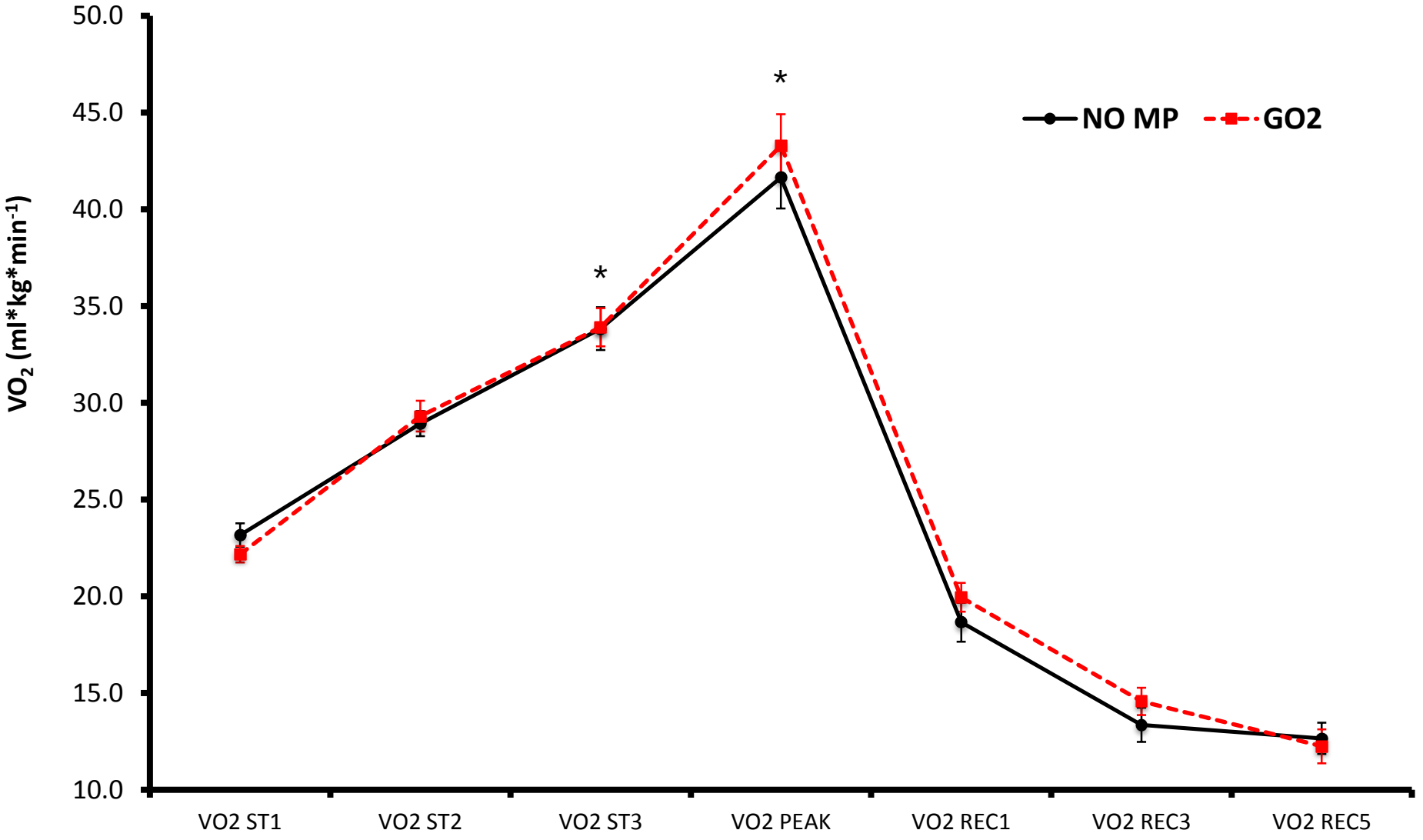

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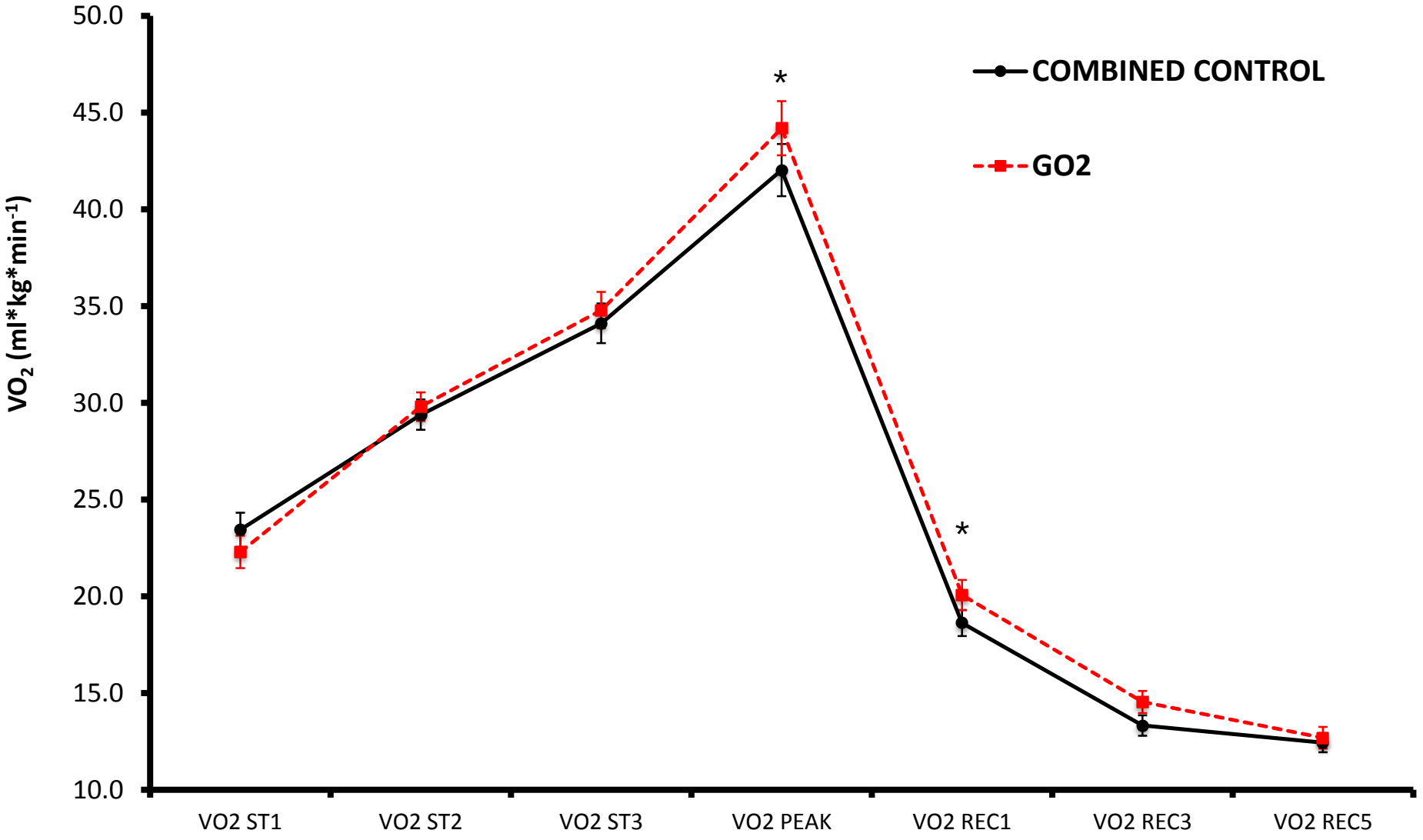
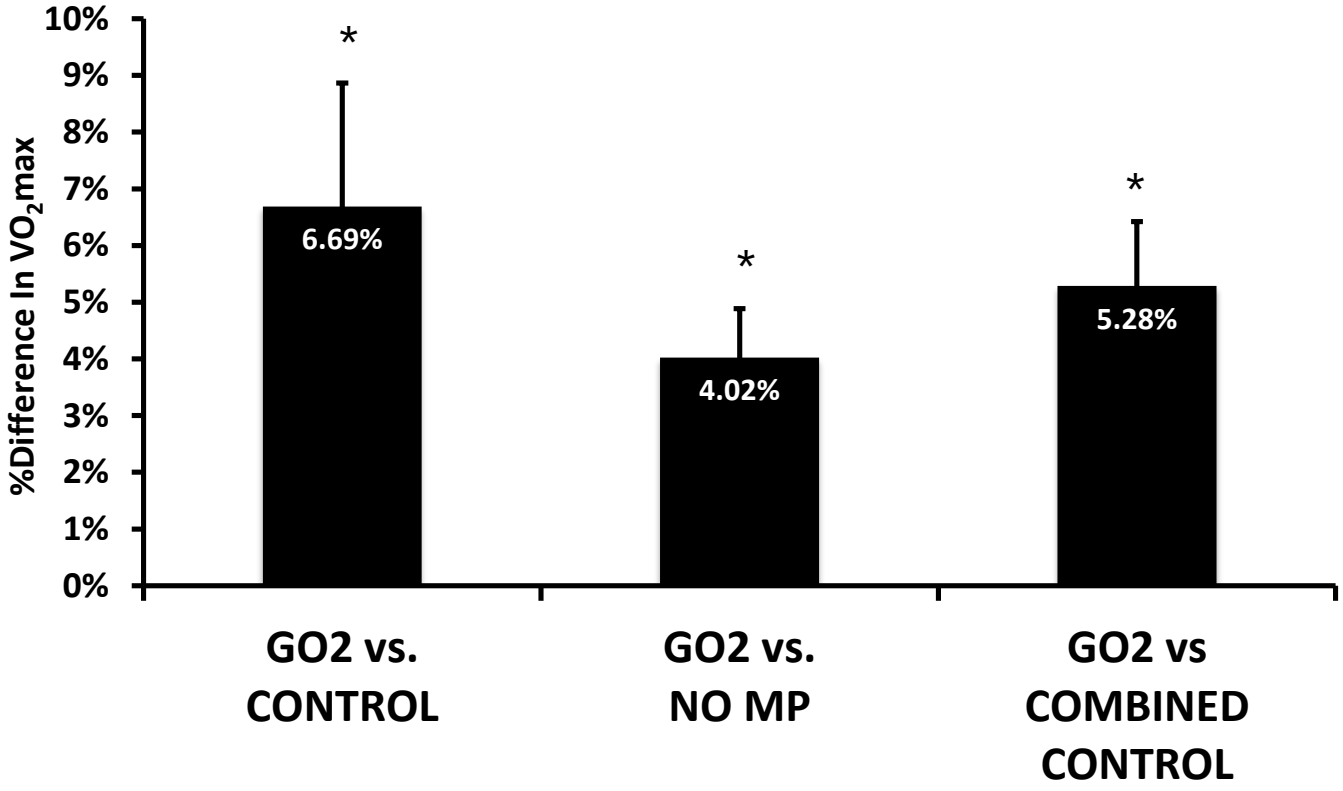


OBRL – GO2 Project Results Summary (VO_2max)

KEY: Data are presented as means ± standard error for % difference in VO2 (ml/kg/min) measured during graded exercise cycle testing * = Significant difference between GO2 and listed conditions below.

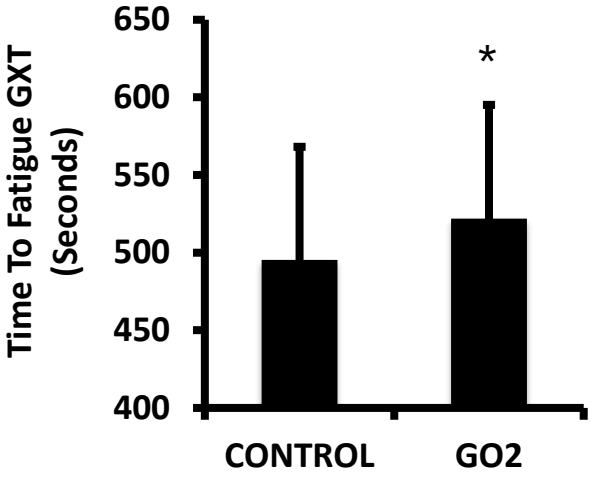
QUESTION: Does using the GO2 during GXT have an effect on VO_2max?

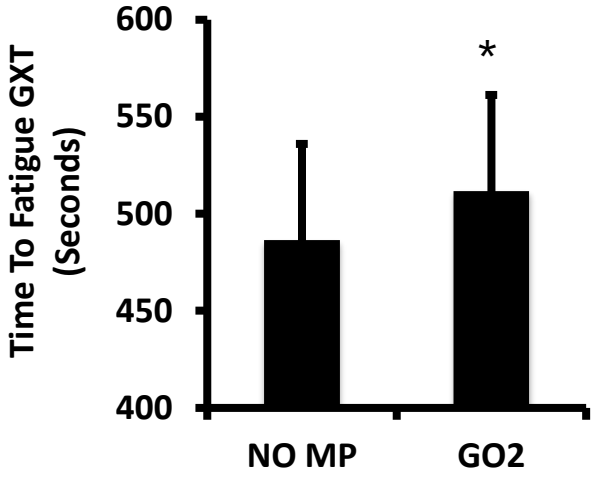
ANSWER: YES.

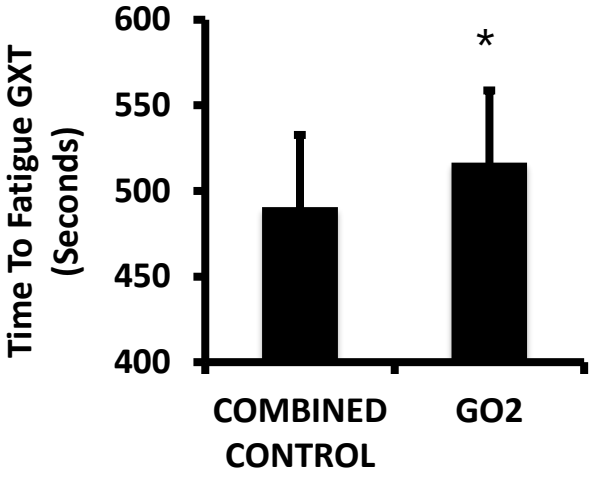


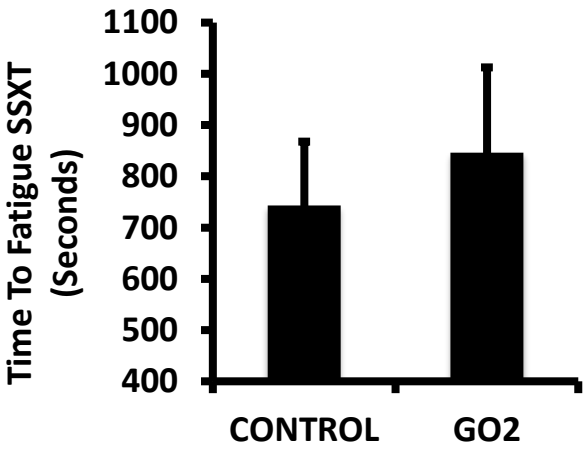
OBRL – GO2 Project Results Summary (Time to Fatigue)

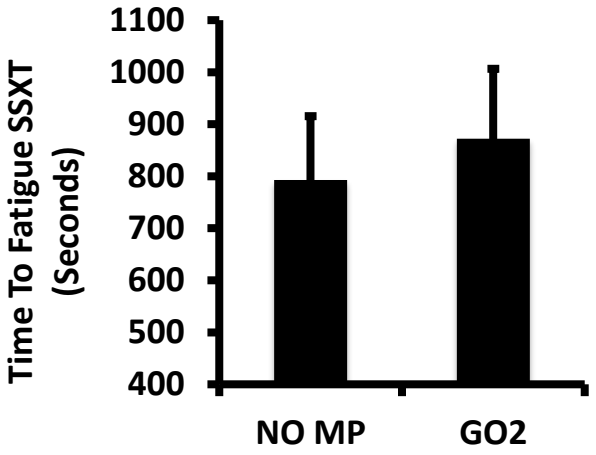
KEY: Data are presented as means ± standard error for time to fatigue (seconds) for the graded maximal cycling test and during steady state testing at a workload associated with each individual's anaerobic threshold. *=Significantly Different at $p<0.05$.

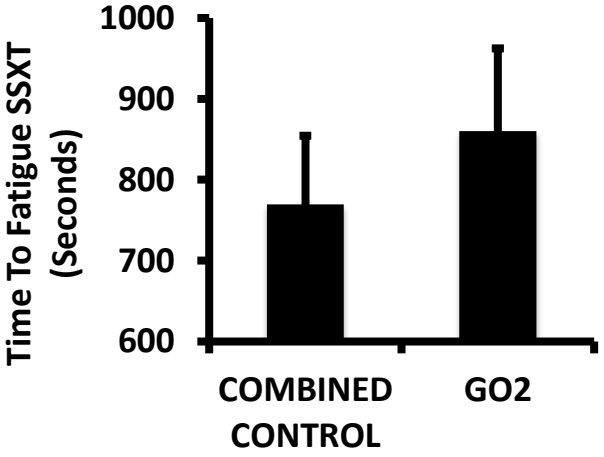








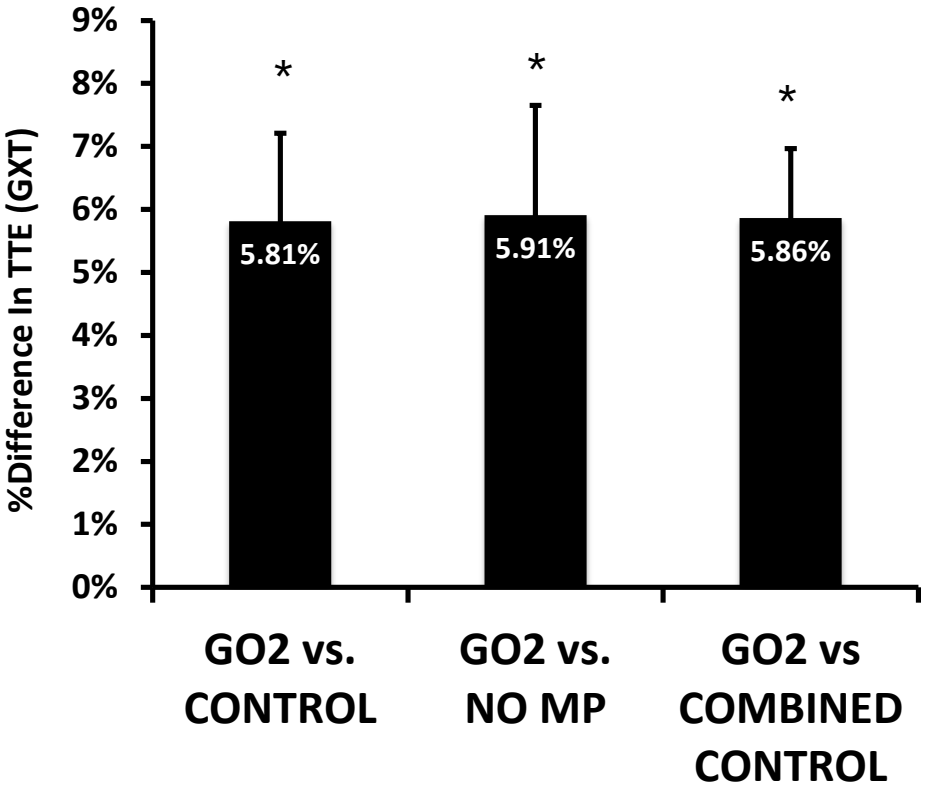


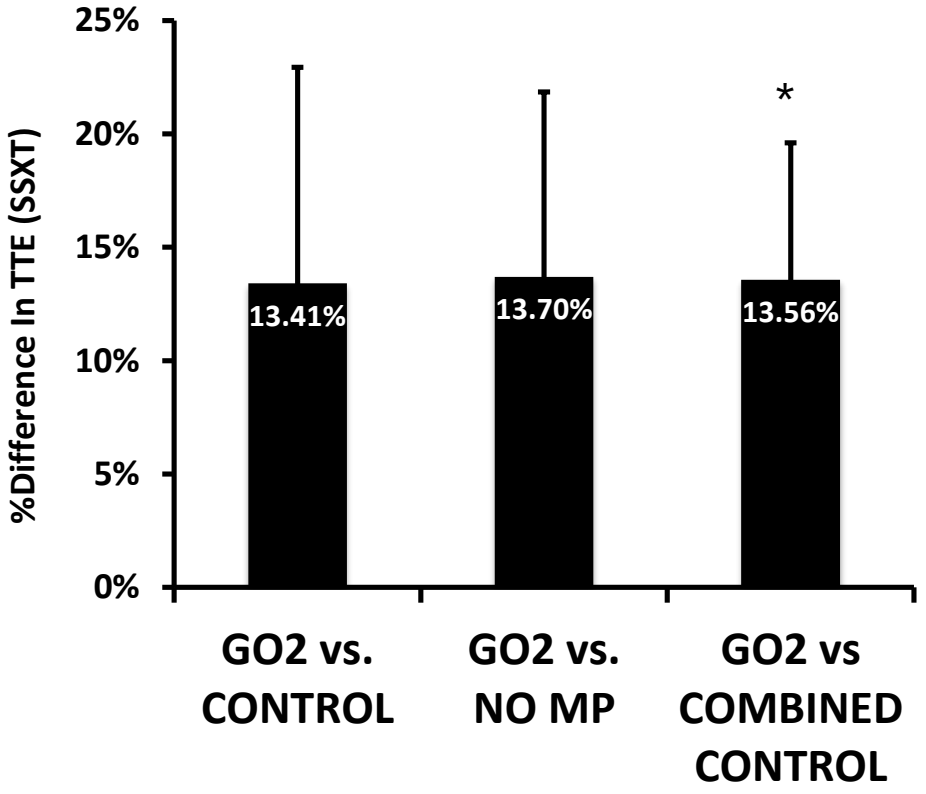


OBRL – GO2 Project Results Summary (Time to Fatigue)

KEY: Data are presented as means ± standard error for % difference in time to exhaustion measured during graded exercise cycle testing * = Significant difference between GO2 and listed conditions below.

QUESTION: Does using the GO2 during GXT and SSXT improve endurance?
ANSWER: YES FOR GXT; MAYBE FOR SSXT





OBRL – GO2 Project Results Summary (Anaerobic Threshold)

KEY: Data are presented as means ± standard error for VO2 workload at which participants reached anaerobic threshold
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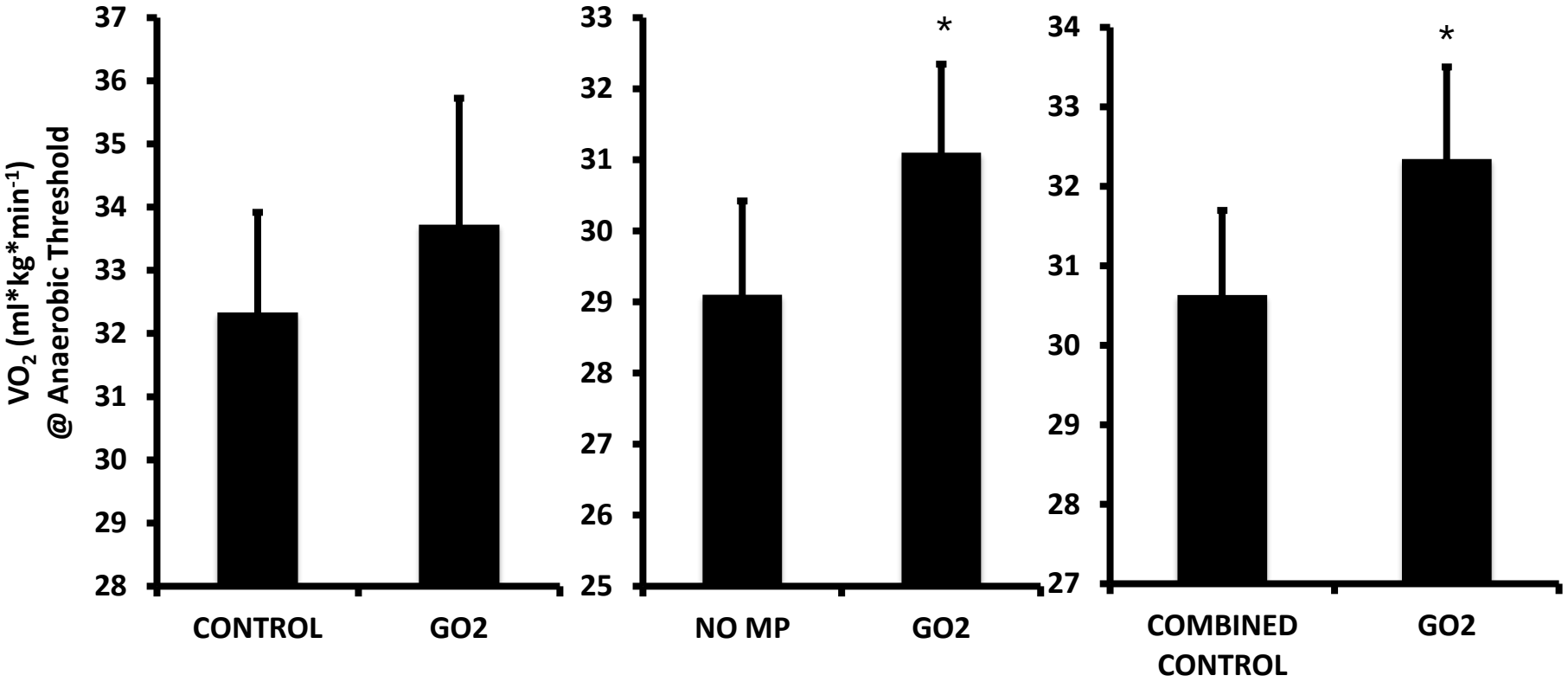
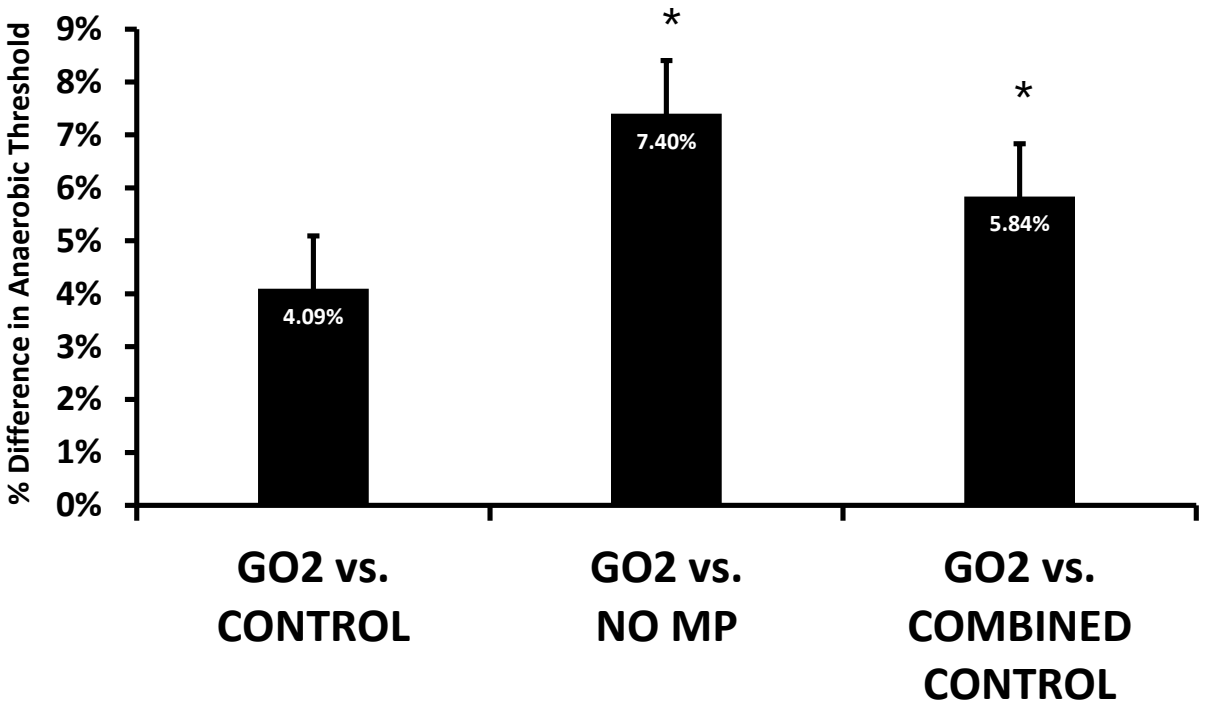


OBRL – GO2 Project Results Summary (Anaerobic Threshold)

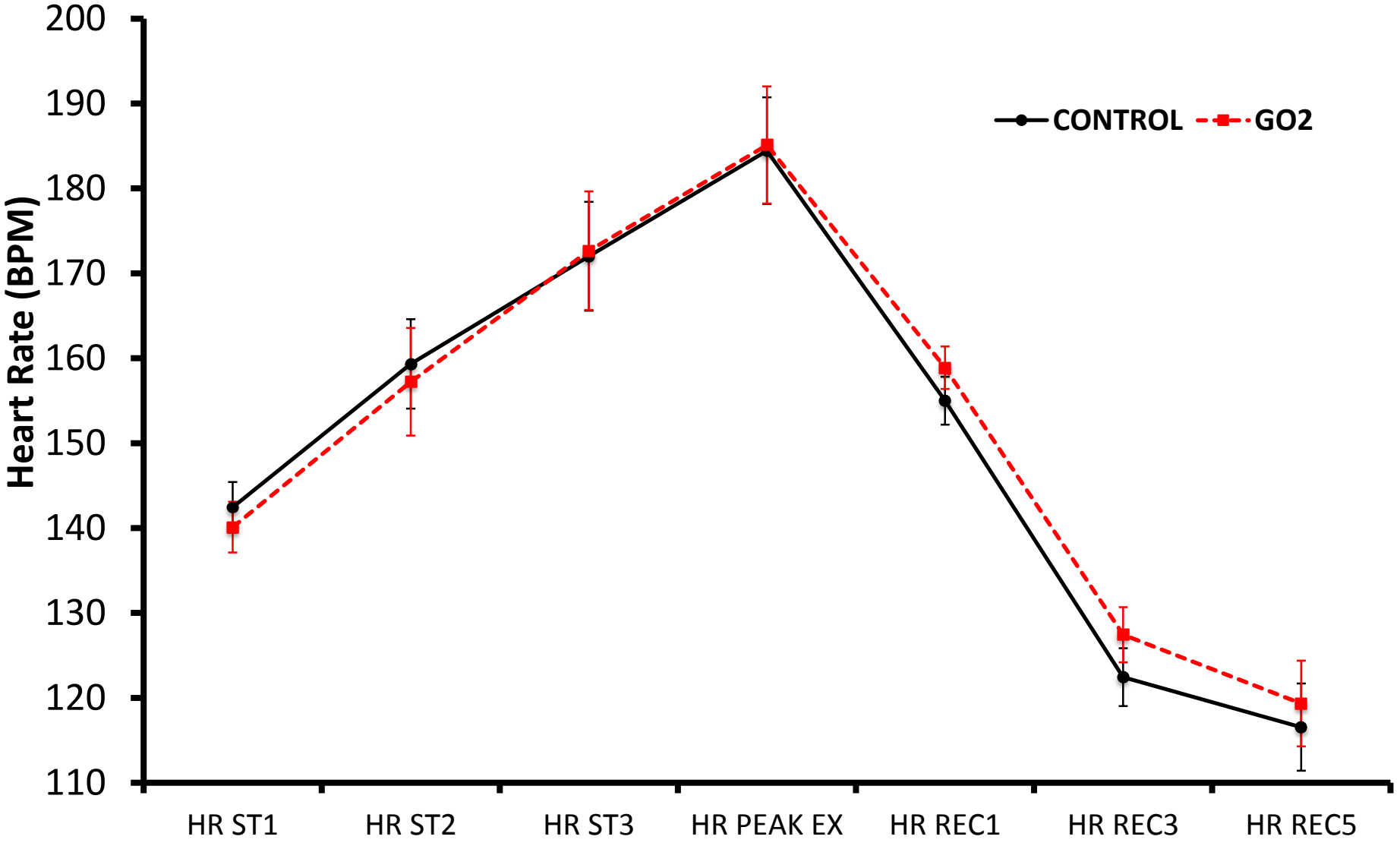
KEY: Data are presented as means ± standard error for % difference in VO2 at which participants reached anaerobic threshold * = Significant difference between GO2 and listed conditions below.

QUESTION: Does using the GO2 during GXT increase anaerobic Threshold?
ANSWER: YES (Compared to NO MP & ALL DATA COMBINED)



OBRL – GO2 Project Results Summary (HEART RATE)

KEY: Data are presented as means ± standard error heart rate recorded during graded exercise testing (GXT). *=Significantly Different at p<0.05.



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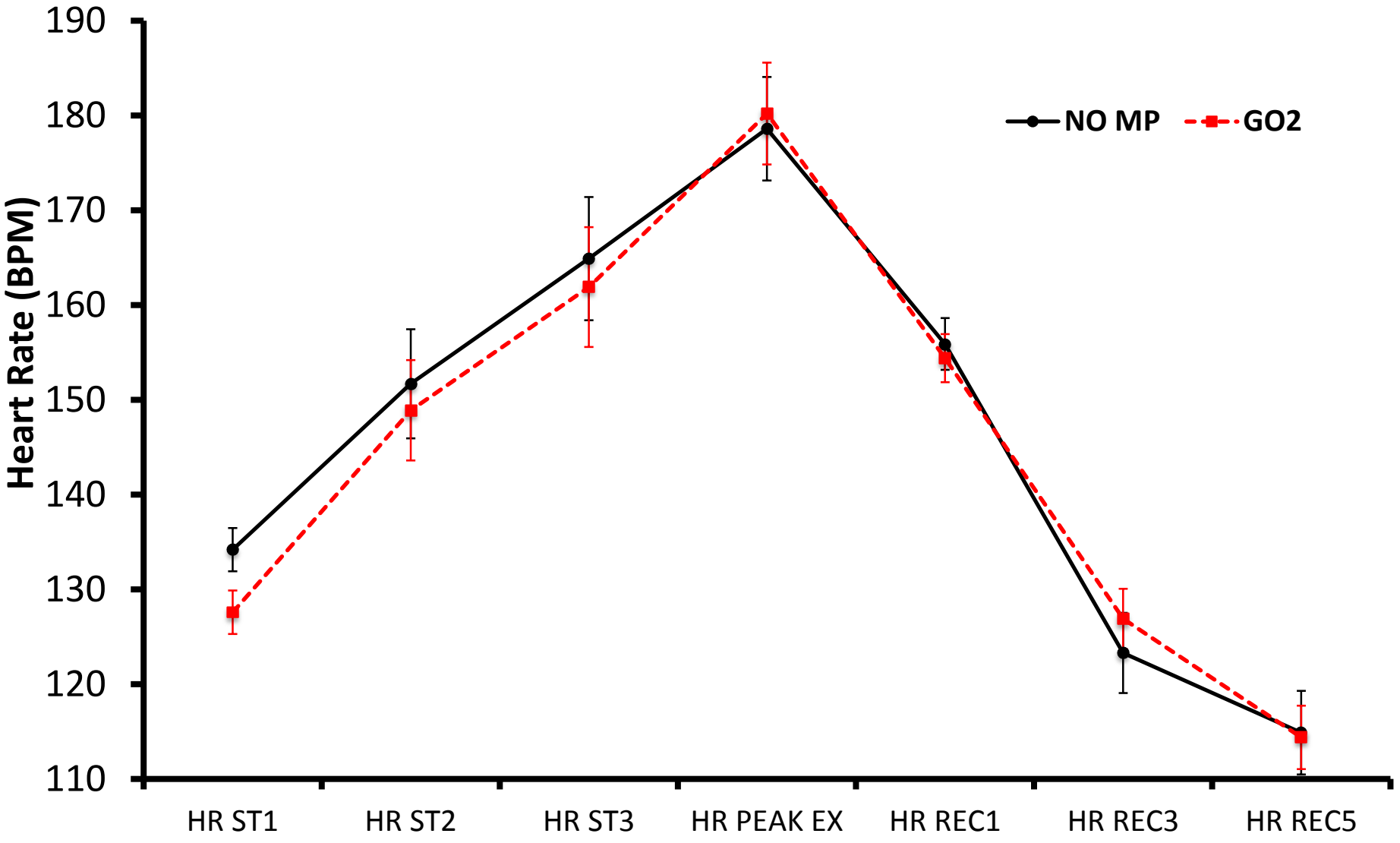

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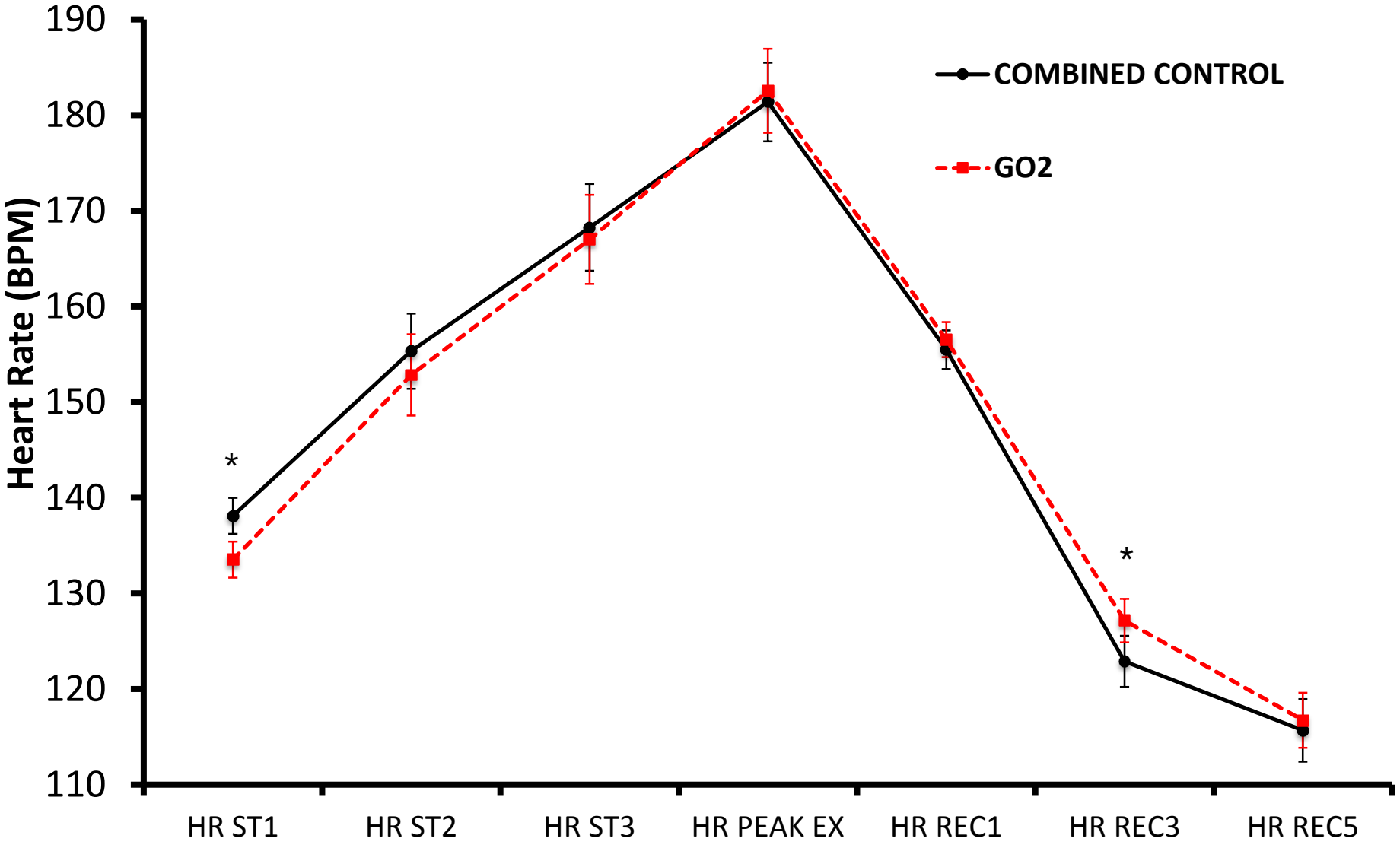
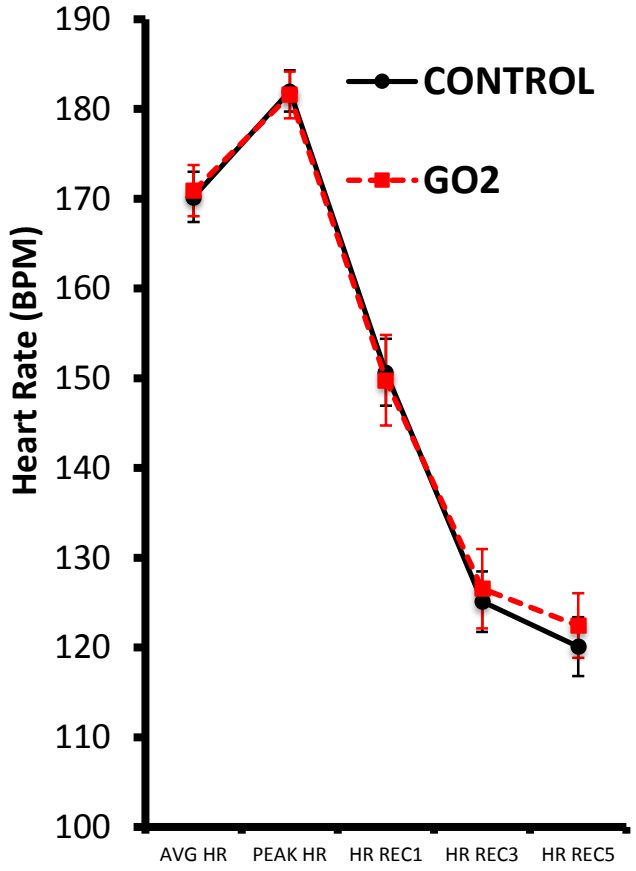
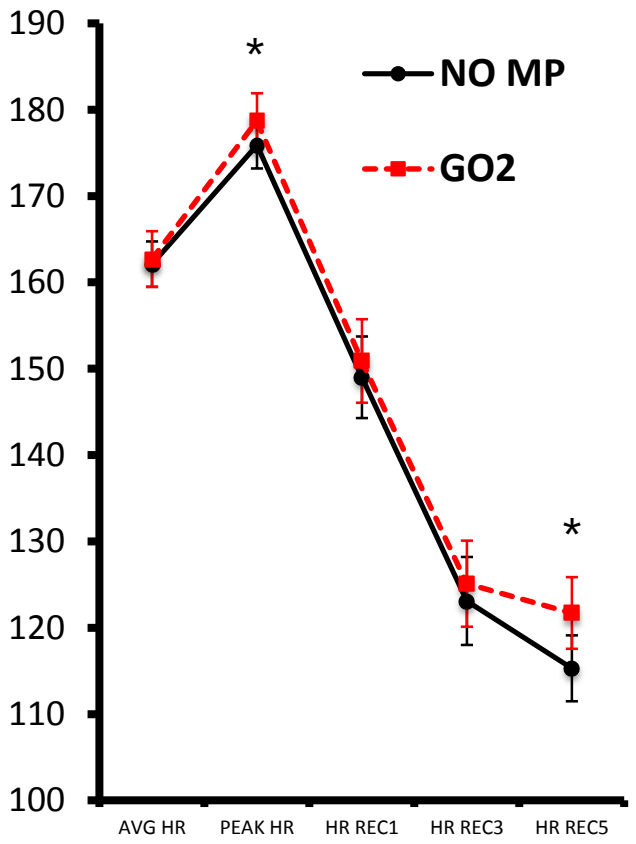
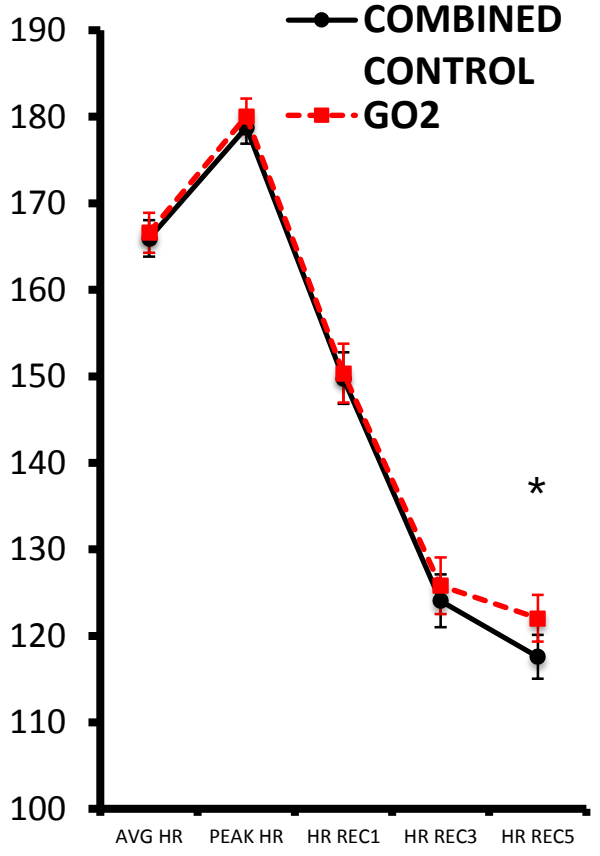


OBRL – GO2 Project Results Summary (HEART RATE)

KEY: Data are presented as means ± standard error heart rate recorded during steady state exercise testing (SSXT). *=Significantly Different at p<0.05.







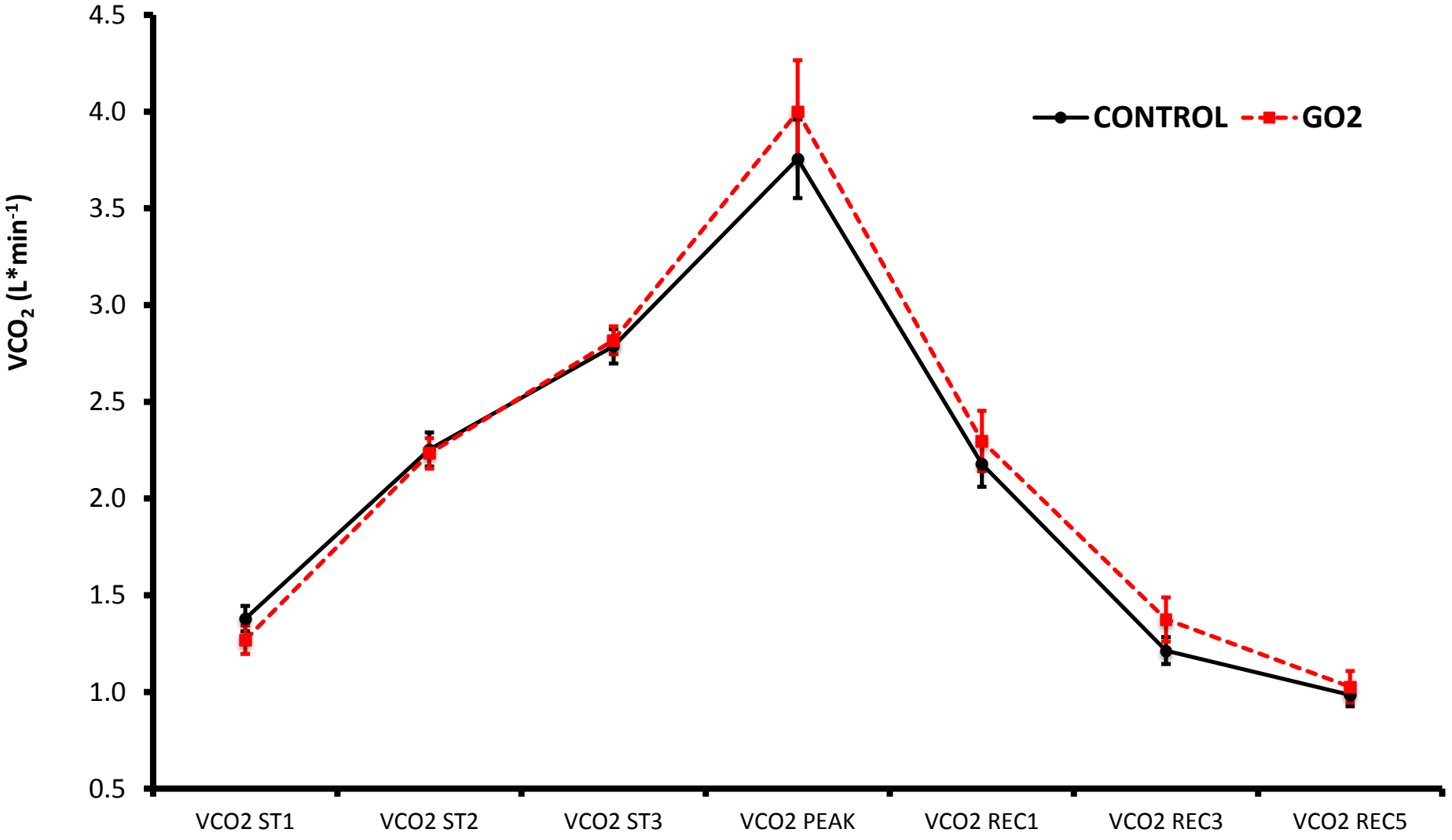
OBRL – GO2 Project Results Summary (Heart Rate)

QUESTION: Does using the GO2 during GXT have an impact on stage-matched heart rates? Does using the GO2 result in enhanced heart rate recovery following peak exercise?

ANSWER: Maybe, when data from both trials were combined, HR was found to be reduced during stage 1 of GXT (moderate intensity exercise). However, HR was found to be elevated when using the GO2 compared during recovery from GXT and SSXT. This may indicate that while the GO2 may optimize performance, it may not be optimal for using during recovery from exercise.

OBRL – GO2 Project Results Summary (VCO_2 L*min^{-1})

KEY: Data are presented as means ± standard error for VCO2 (L/min) measured during graded exercise cycle testing. * = Significant difference between conditions at the same measurement time-point (p<0.05)



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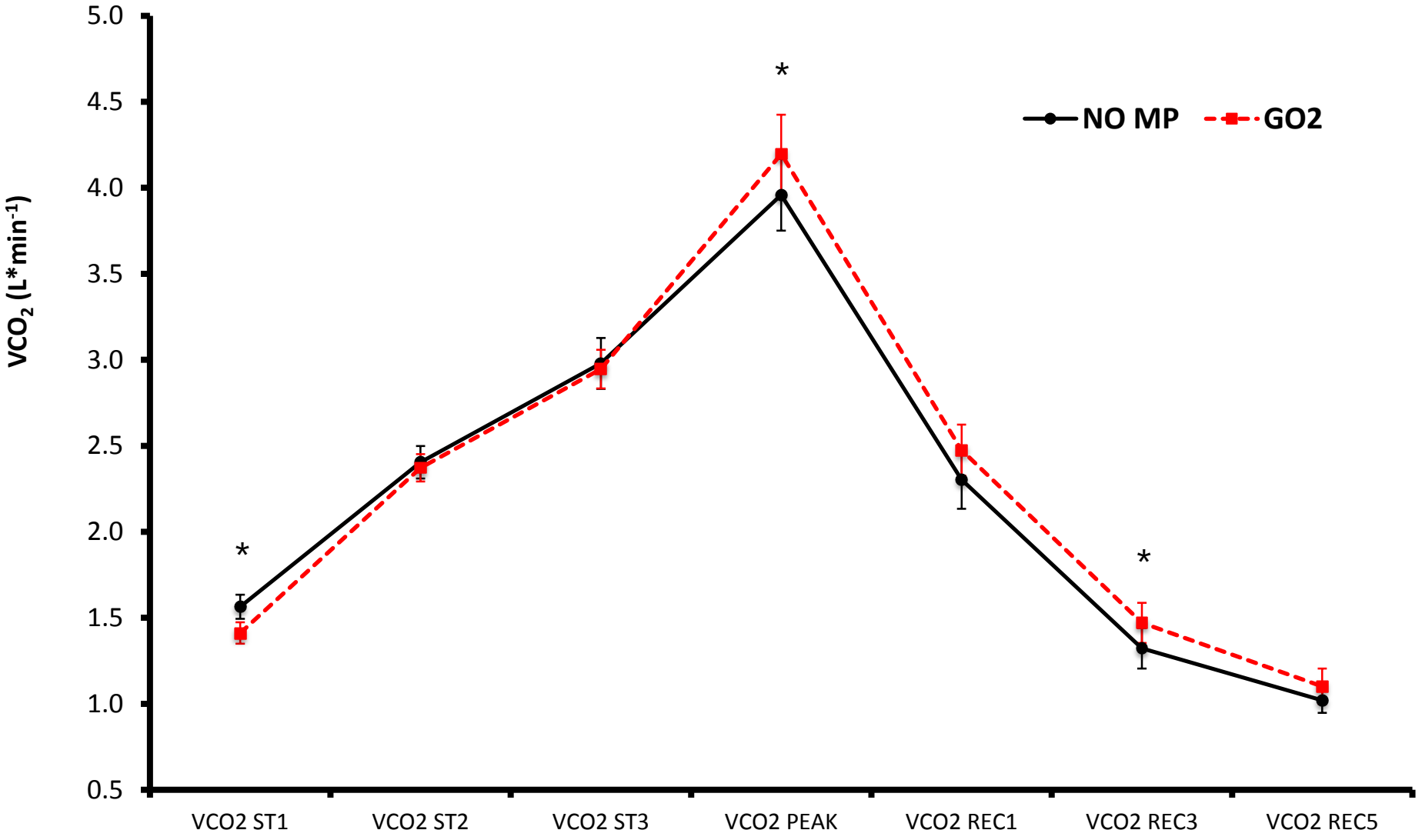

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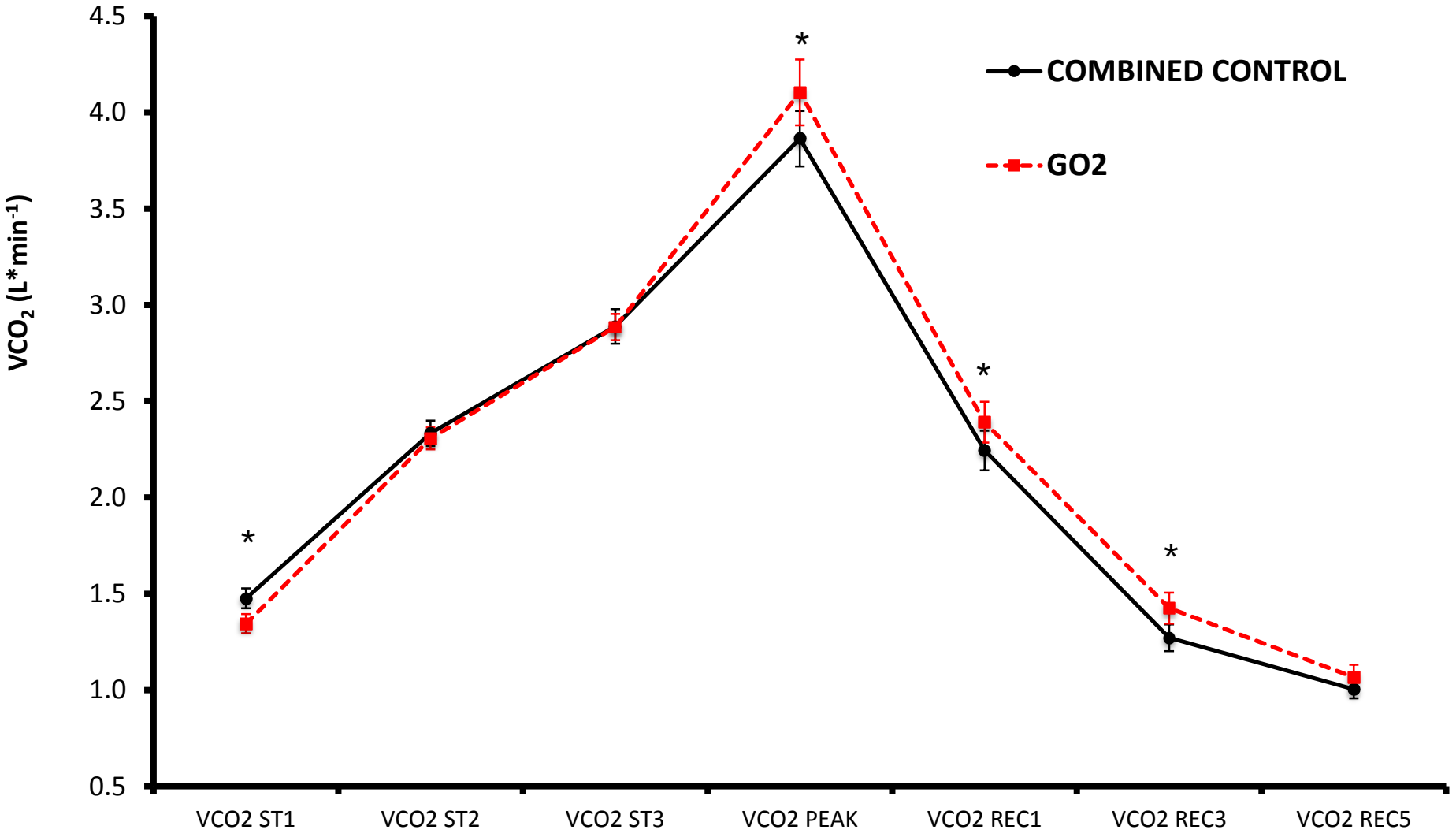

OBRL – GO2 Project Results Summary (VCO_2 & RER)

QUESTION: Does using the GO2 have a significant effect on the volume of exhaled CO_2 during GXT or SSXT?

ANSWER: Potentially. When analyzing VCO2, there was an effect of GO2 at stage 1 of GXT, Peak GXT, and at 3 minutes of recovery compared to NO MP or all control data combined. Similar to the HR data, these data indicate that the GO2 may be beneficial during performance, but not recovery.

QUESTION: Does using the GO2 have a significant effect on RER (VO_2/VCO_2) during GXT or SSXT during recovery?

ANSWER: Maybe, RER was found to be elevated compared to NO MP during 5min of recovery. (NO MP: 1.059 ± 0.031; GO2: 1.174 ± 0.036)

OBRL – GO2 Project Results Summary (Respiratory Rate)

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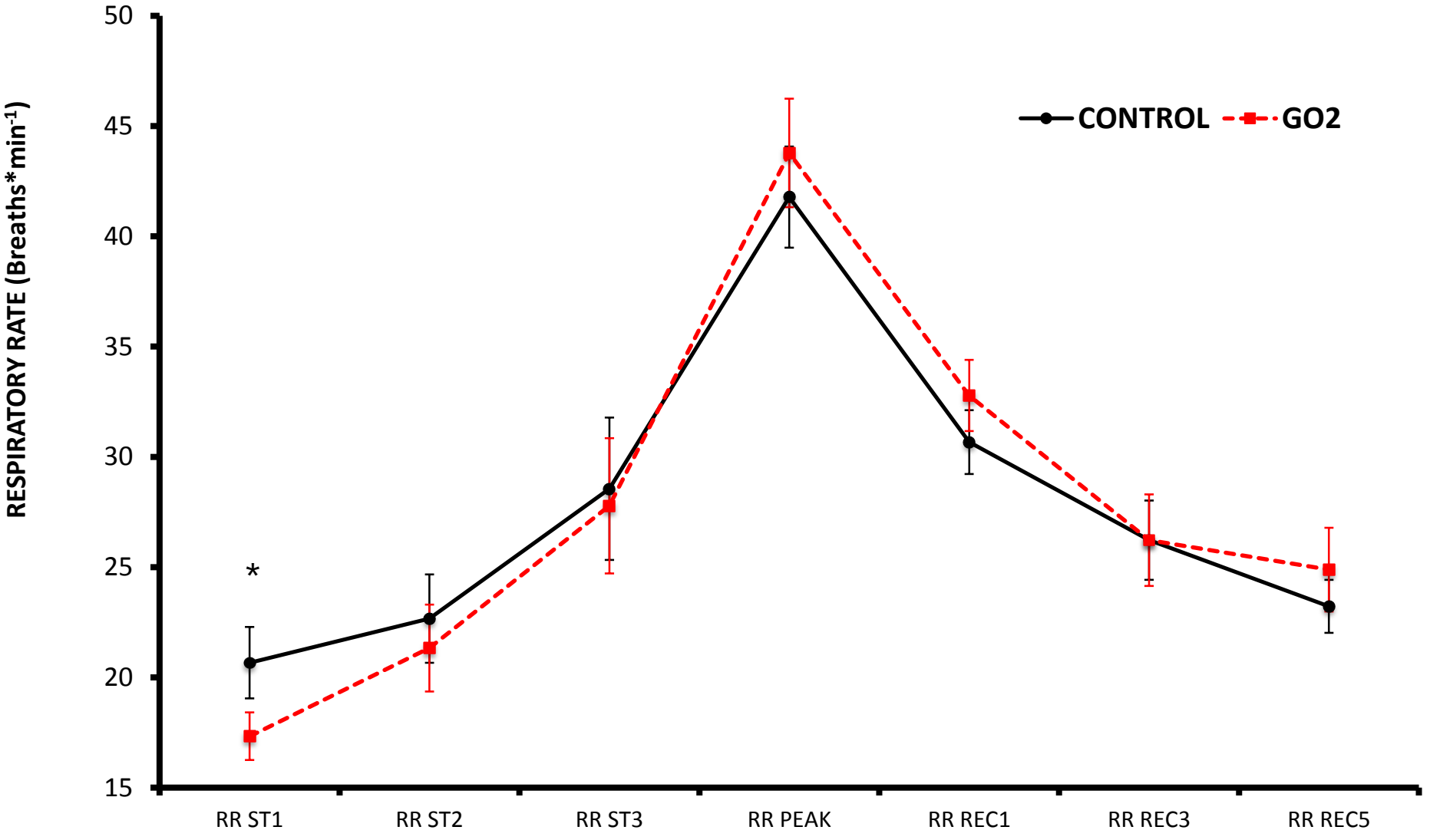

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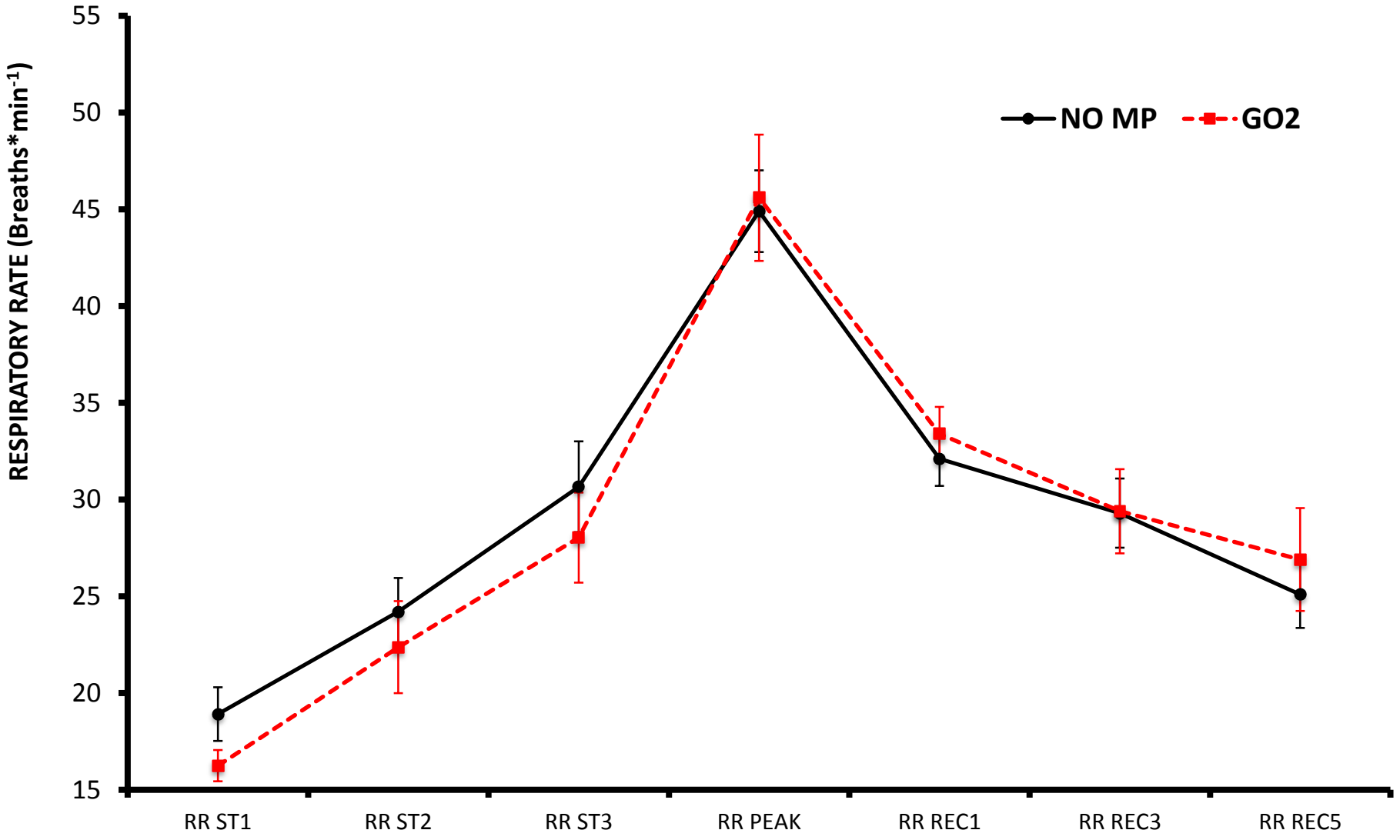

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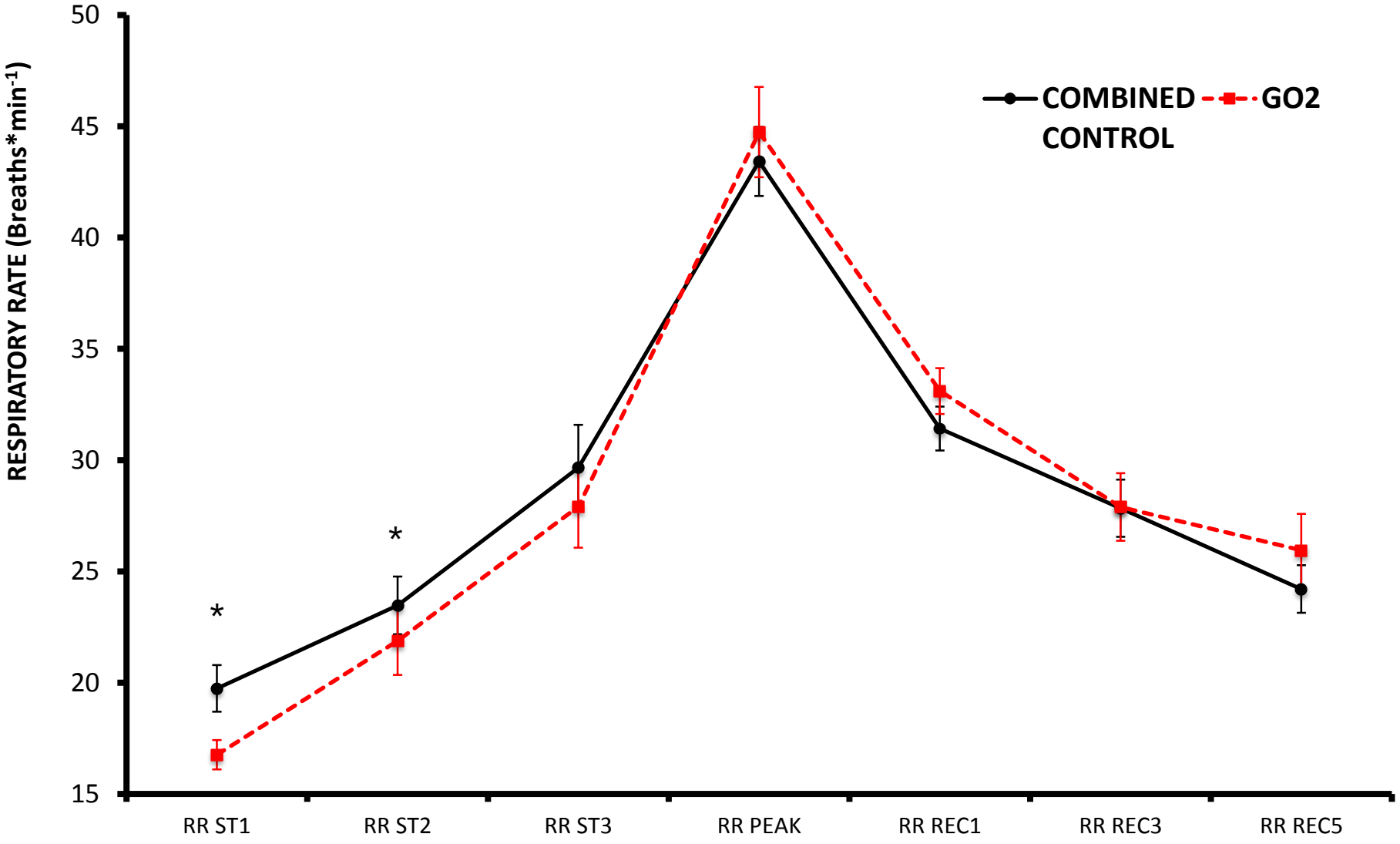

OBRL – GO2 Project Results Summary (Respiratory Rate)

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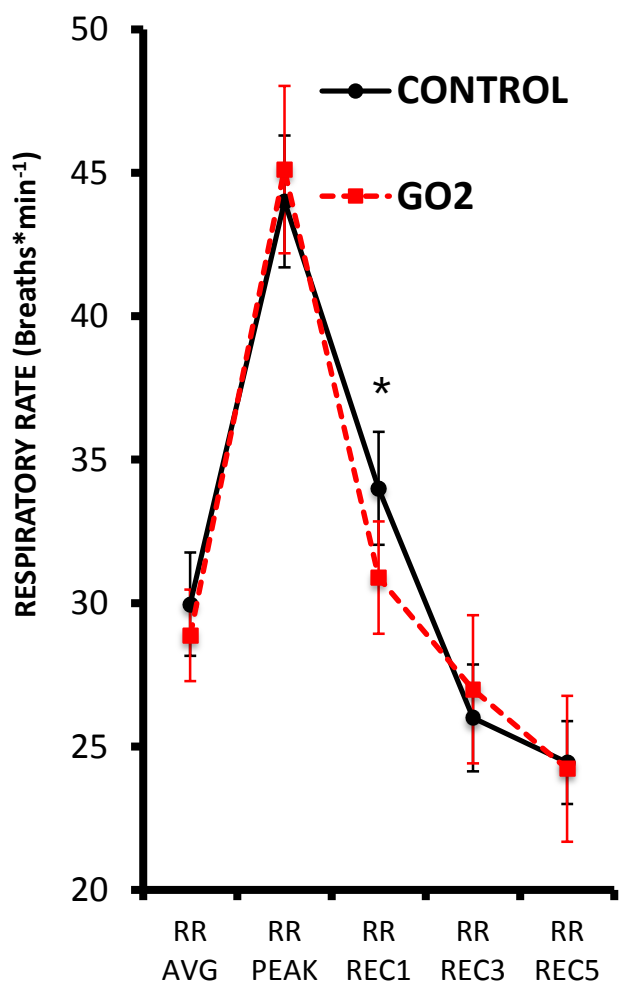
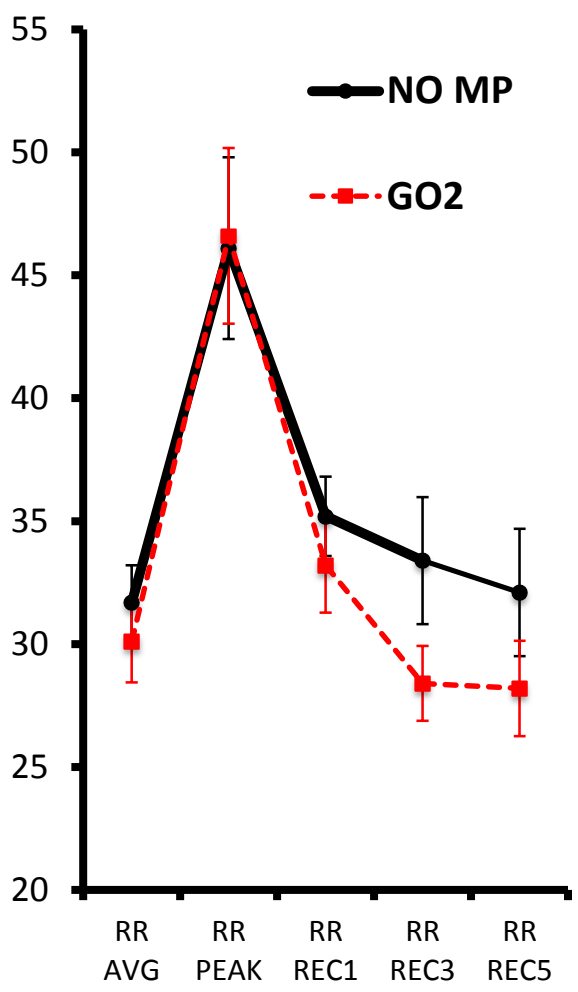
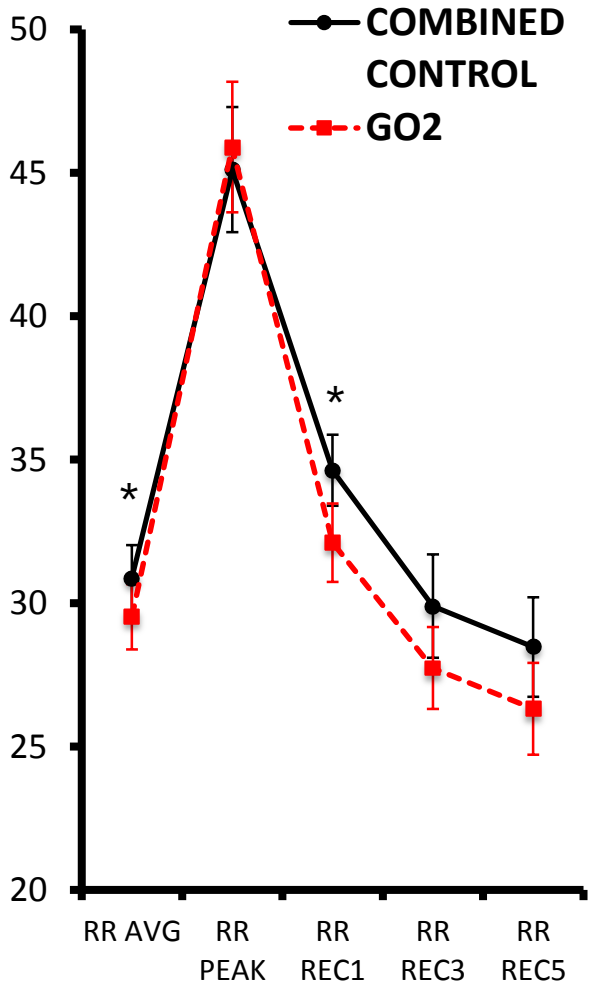






OBRL – GO2 Project Results Summary (Respiratory Rate, RR)

QUESTION: Does using the GO2 have a significant effect on respiratory rate (breaths / min) during GXT or SSXT.

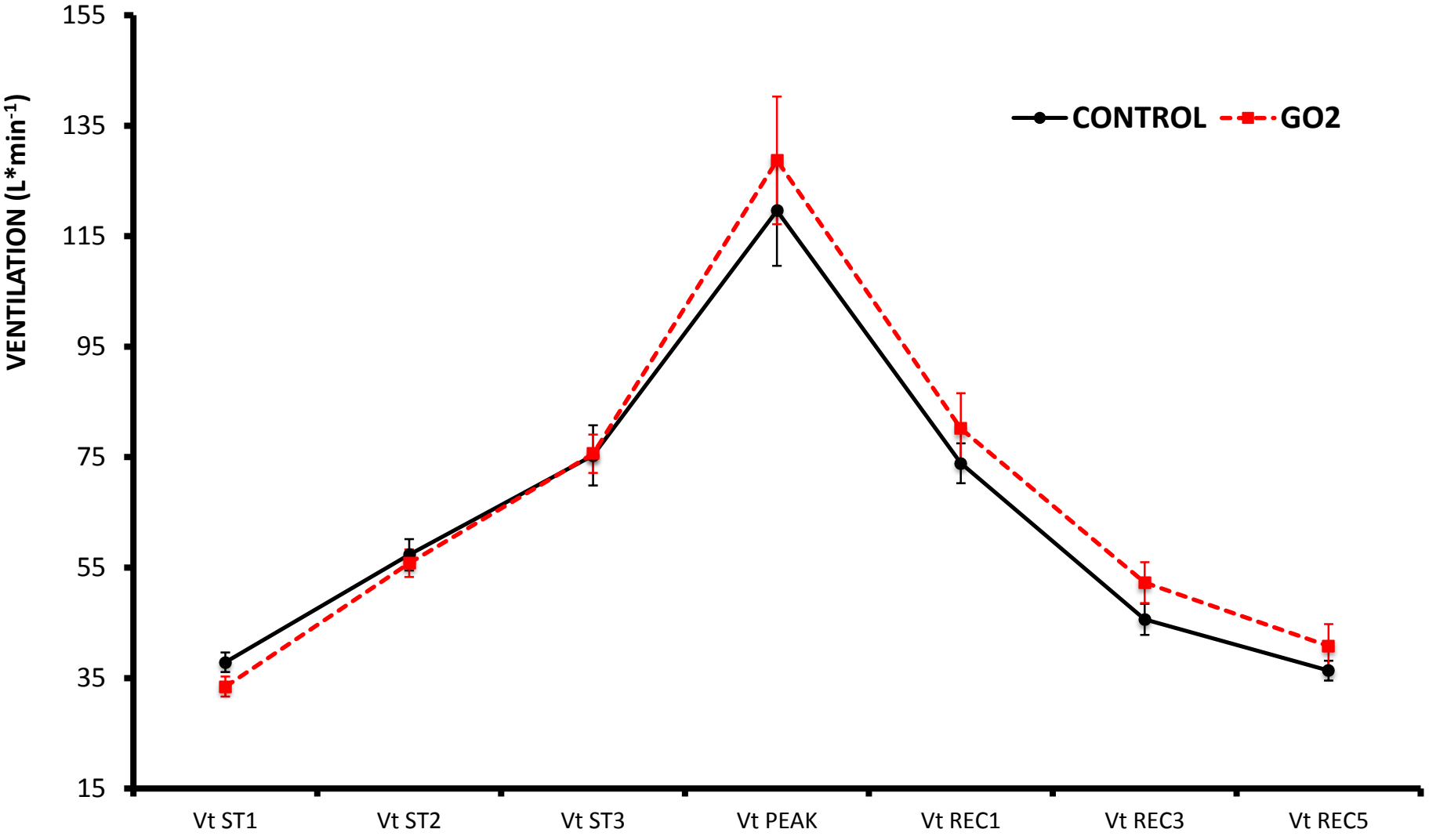
ANSWER: YES, a decrease was observed at stage 1 of GXT (🡻 14 ± 5%, -3.3±1.3 breaths*min). This was also observed when observing the GO2 against both control groups (NO MP & CONTROL) combined for stage 1 and 2 of GXT. When looking at the combined data, average RR during SSXT was reduced when using the GO2.

QUESTION: Does using the GO2 have a significant effect on respiratory rate (breaths*min) during recovery from exercise?

ANSWER: Potentially. When adjusting for control RR, a decrease was observed at 1 minute following SSXT(🡻9 ± 4%, -3.1±1.5 breaths*min). This was not observed following maximal graded exercise. This trend was also observed when analyzing the combined data sets.

OBRL – GO2 Project Results Summary (Ventilation ($L*min^{-1}$))

KEY: Data are presented as means ± standard error for ventilation (vt) measured during graded exercise cycle testing. * = Significant difference between conditions at the same measurement time-point ($p<0.05$)



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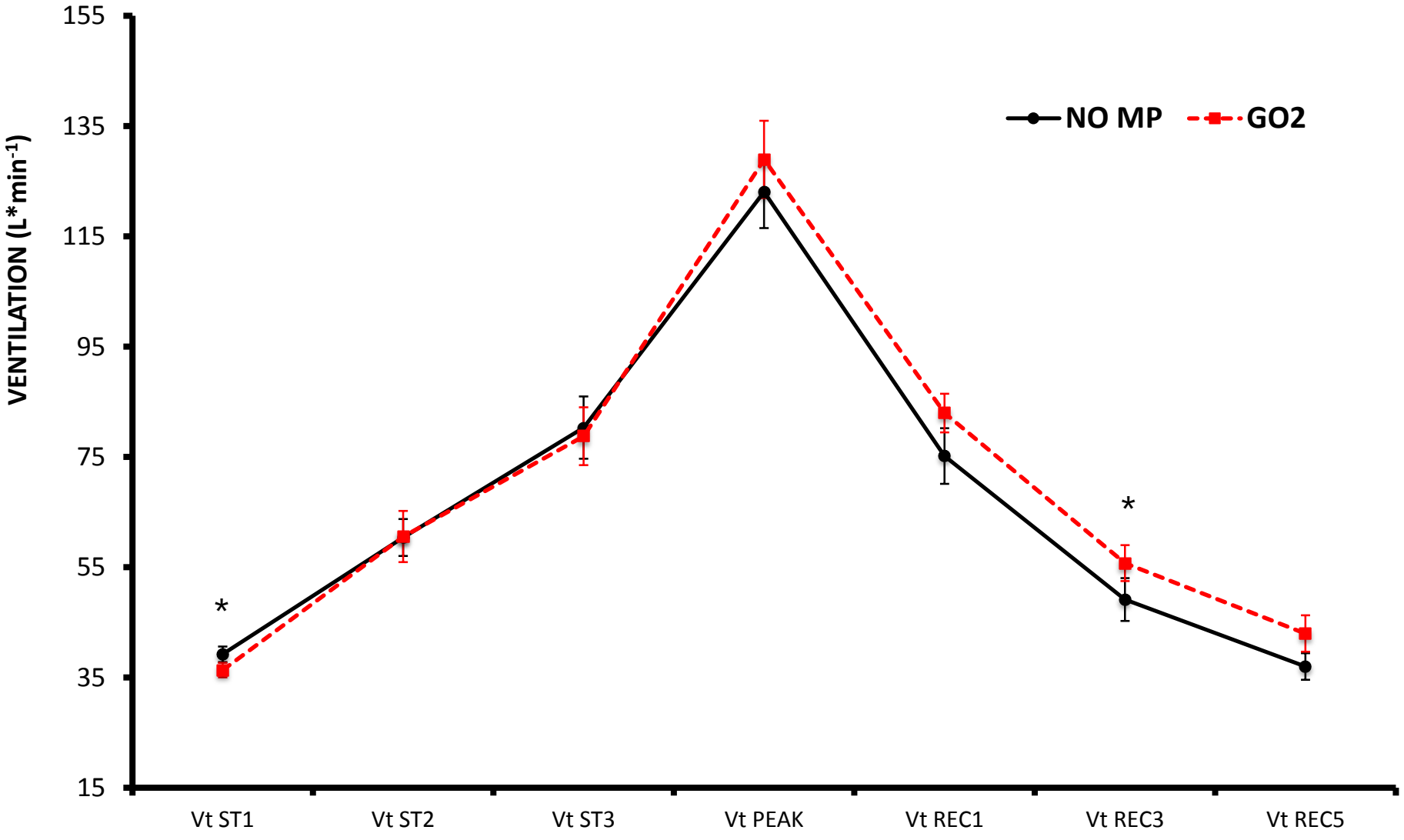

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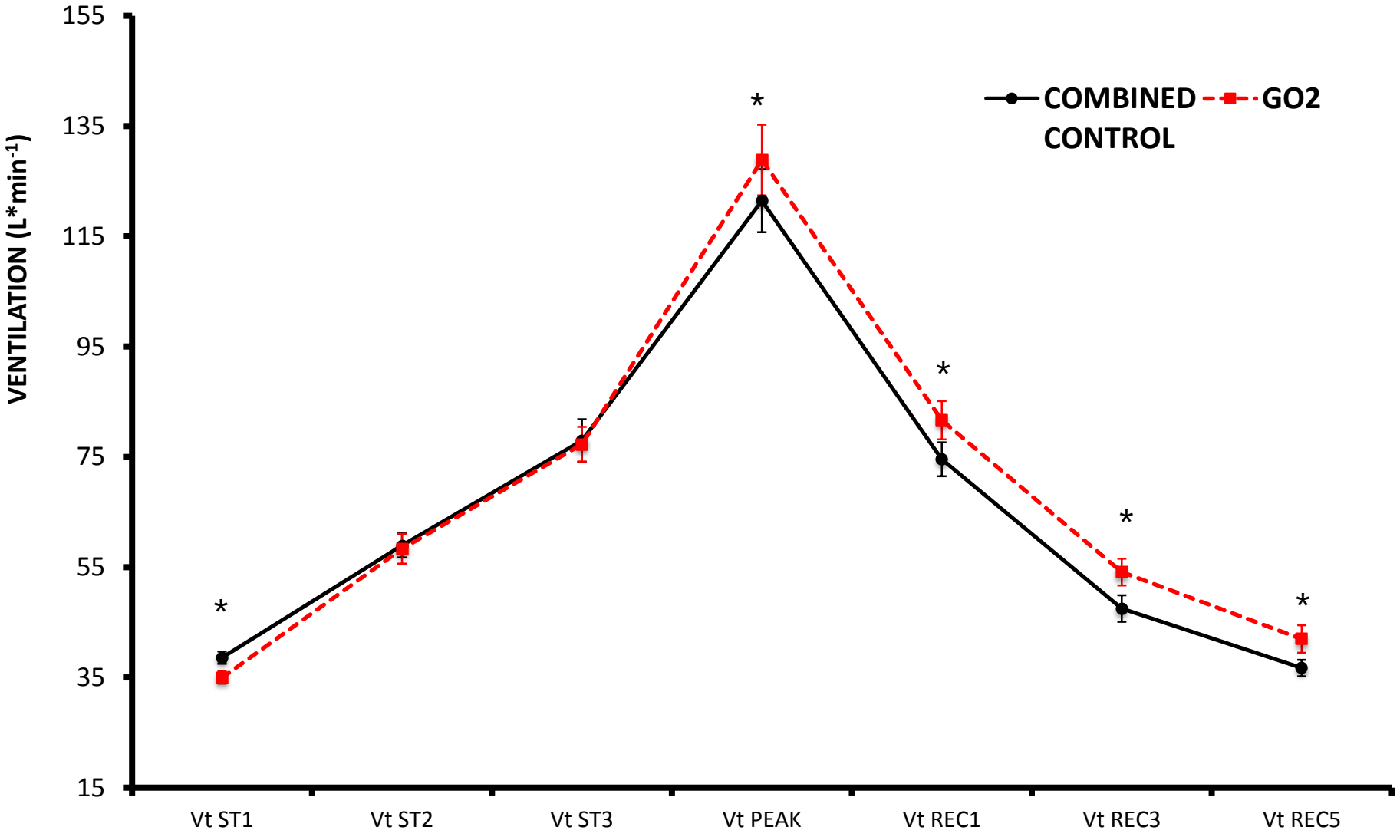


OBRL – GO2 Project Results Summary (Ventilation)

QUESTION: Does using the GO2 have a significant effect on ventilation ($L*min^{-1}$) during GXT?

ANSWER: YES (compared to NO MP & all control data combined).

QUESTION: Does using the GO2 have a significant effect on ventilation ($L*min^{-1}$) during SSXT?

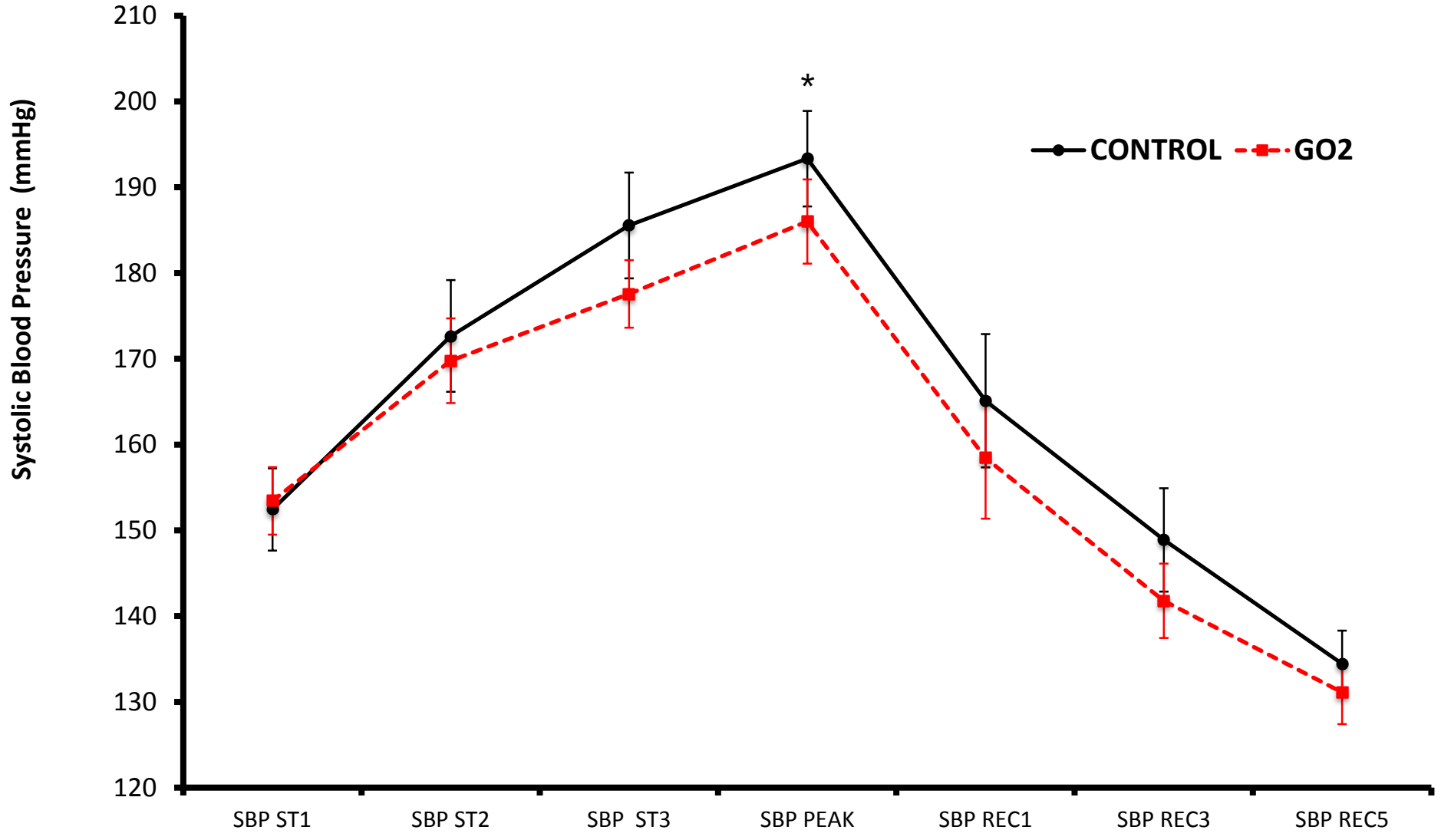
ANSWER: No

QUESTION: Does using the GO2 have a significant effect on ventilation ($L*min^{-1}$) during recovery?

ANSWER: Potentially. When adjusting for ventilation using the control mouthpiece, ventilation was observed to be higher following GXT when compared to control and NO MP.

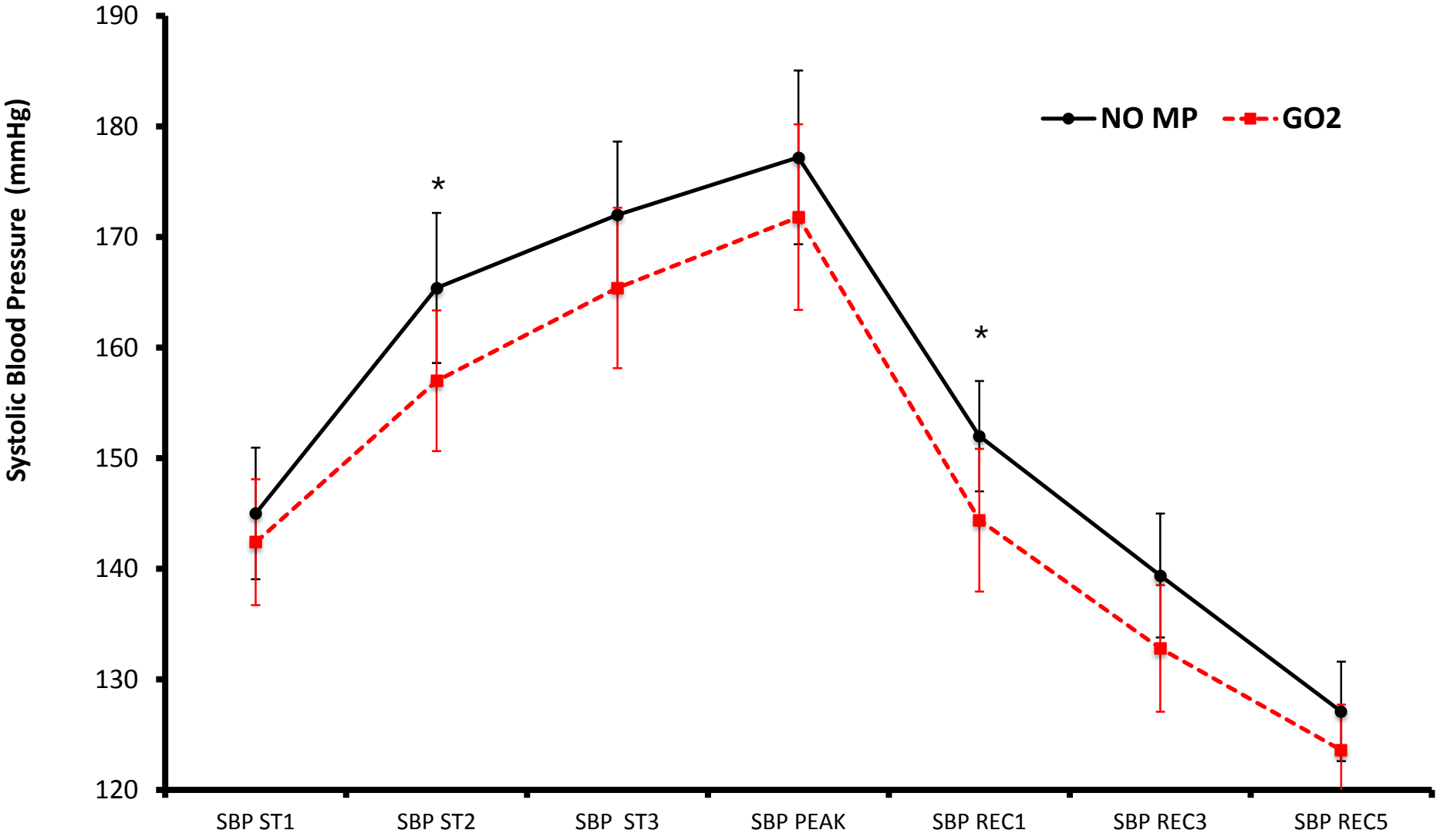
OBRL – GO2 Project Results Summary (Systolic Blood Pressure)

KEY: Data are presented as means ± standard error for systolic blood pressure (SBP) measured during graded exercise cycle testing. * = Significant difference between conditions at the same measurement time-point (p<0.05)



OBRL – GO2 Project Results Summary (Systolic Blood Pressure)

KEY: Data are presented as means ± standard error for systolic blood pressure (SBP) measured during graded exercise cycle testing. * = Significant difference between conditions at the same measurement time-point ($p<0.05$)



OBRL – GO2 Project Results Summary (Systolic Blood Pressure)

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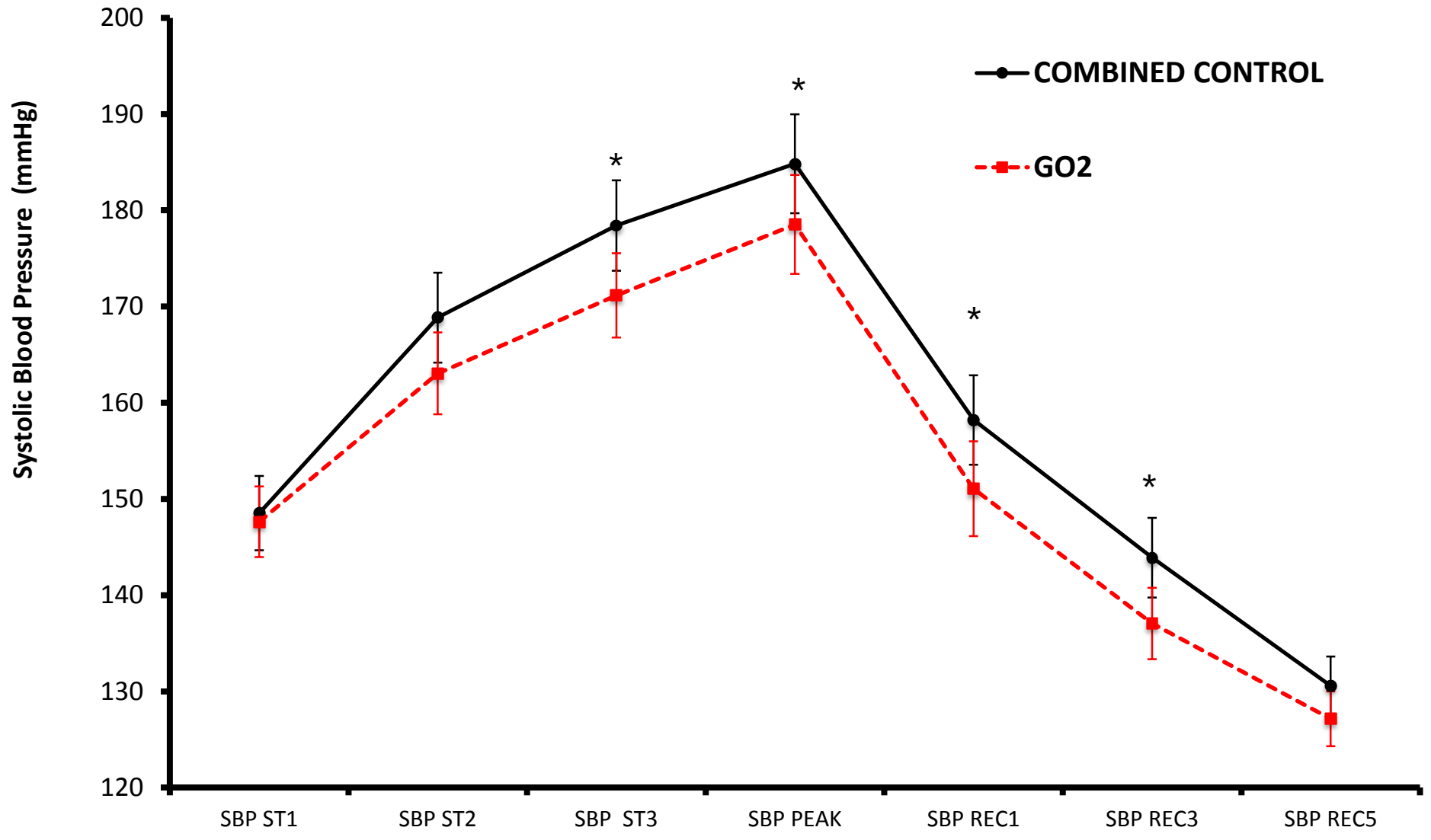
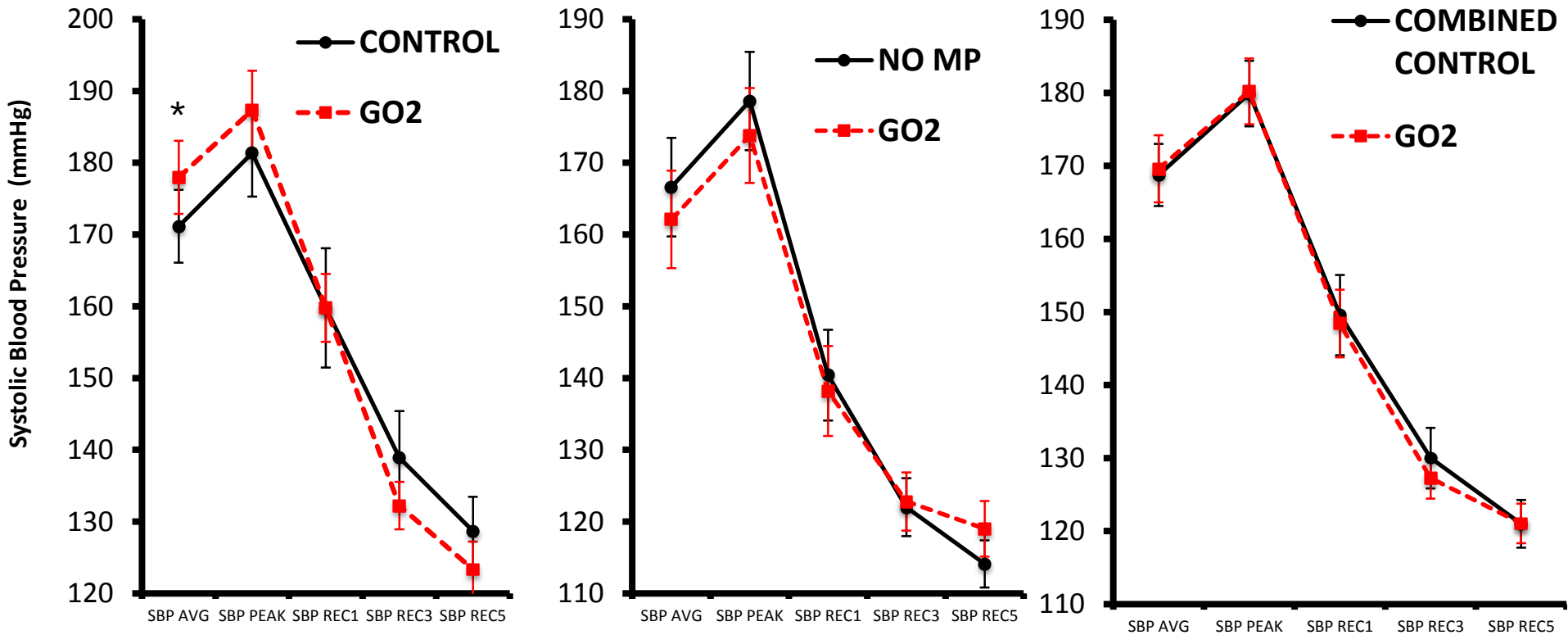


OBRL – GO2 Project Results Summary (Systolic Blood Pressure)

KEY: Data are presented as means ± standard error for systolic blood pressure (SBP) measured during steady state exercise testing. * = Significant difference between conditions at the same measurement time-point (p<0.05)



OBRL – GO2 Project Results Summary (Systolic Blood Pressure)

QUESTION: Does using the GO2 have a significant effect on systolic blood pressure during GXT compared to control or No MP?

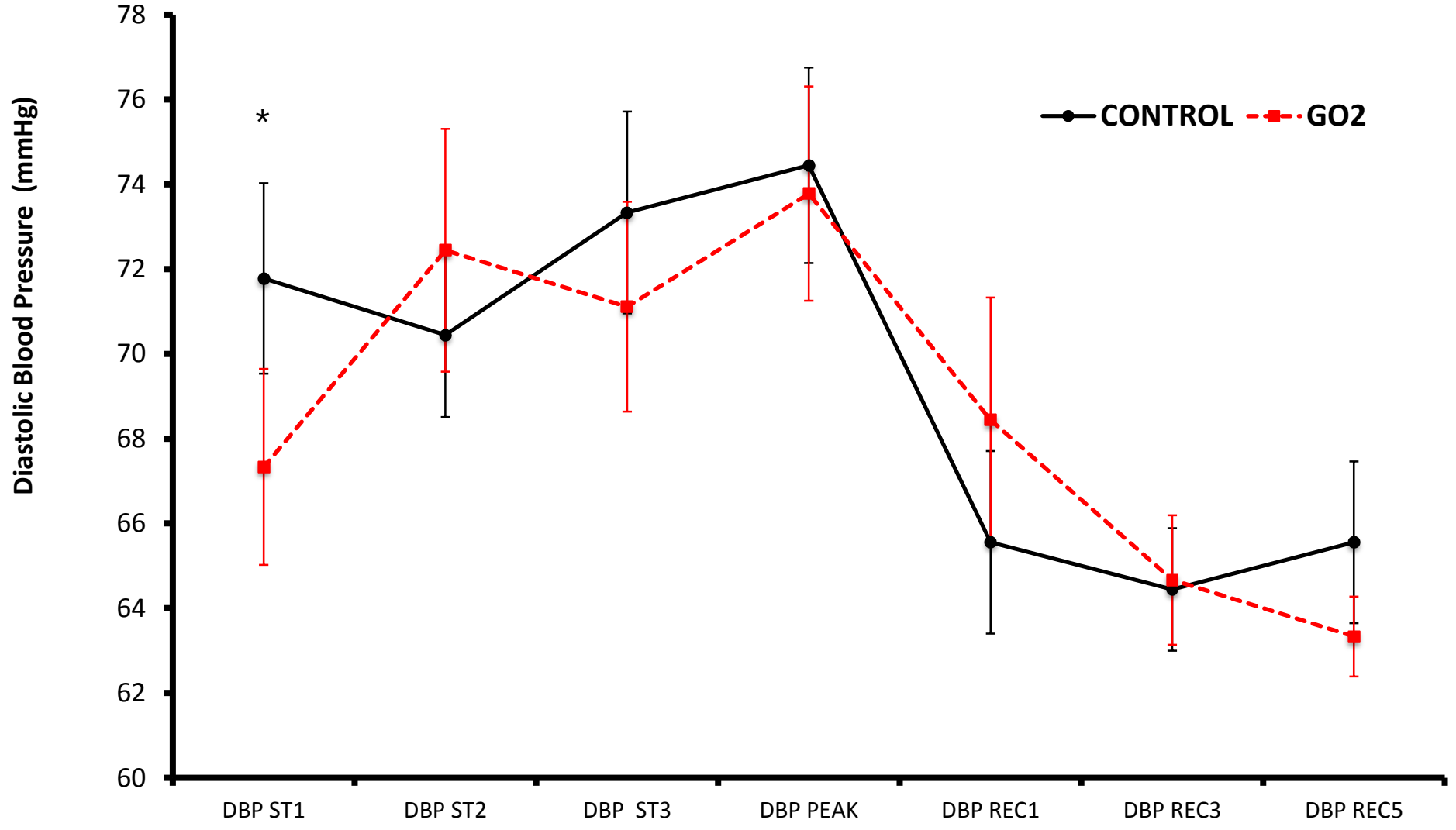
ANSWER: YES. During GXT, the exercising with GO2 was observed to elicit a lower SBP at various points during exercise.

QUESTION: Does using the GO2 have a significant effect on SBP during SSXT compared to control?

ANSWER: Maybe, an elevated mean SBP was observed during SSXT when comparing the GO2 to the control mouthpiece. However, this difference was not observed compared to NO MP or when all control data were combined.

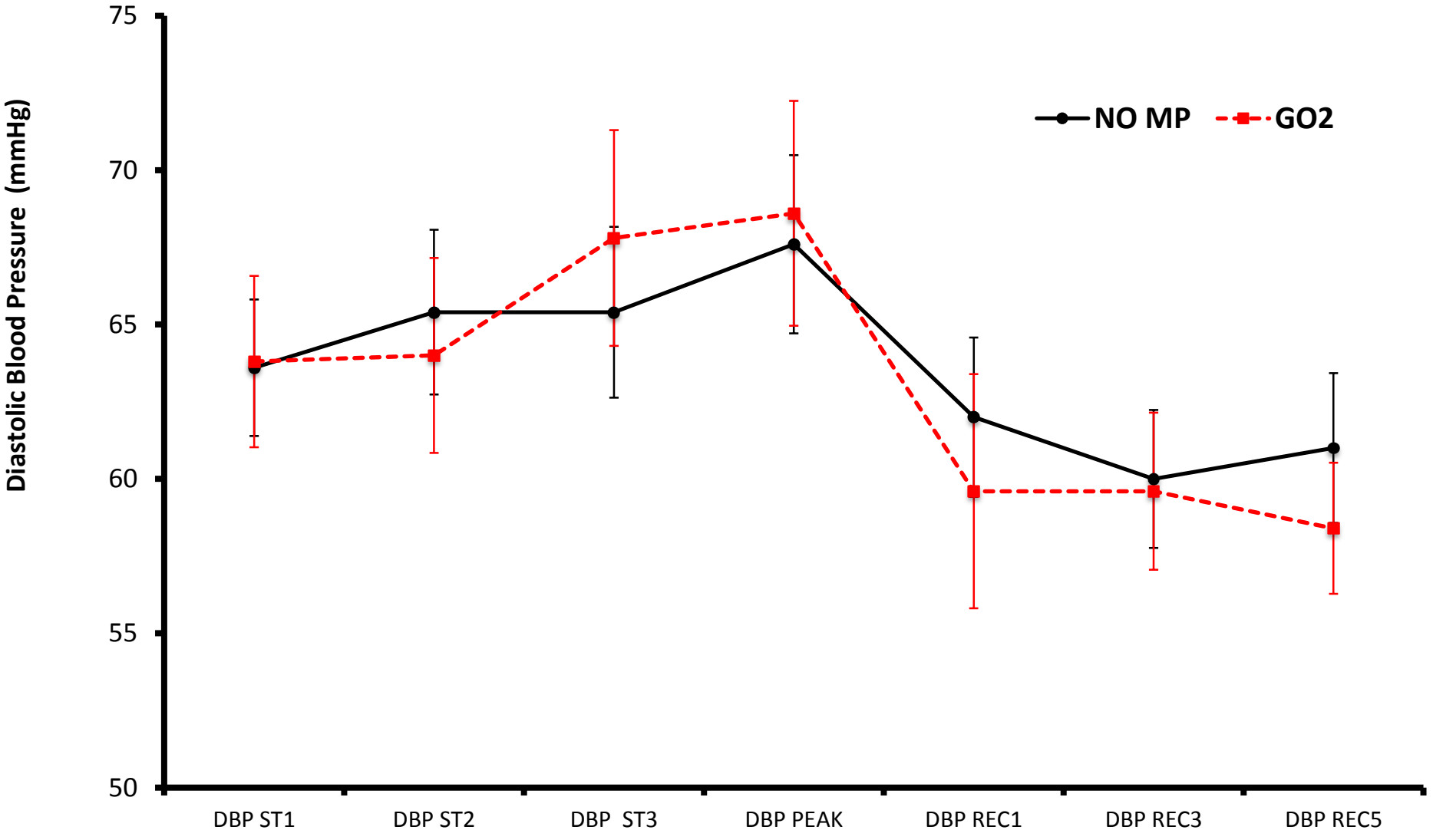
OBRL – GO2 Project Results Summary (Diastolic Blood Pressure)

KEY: Data are presented as means ± standard error for diastolic blood pressure (DBP) measured during graded exercise cycle testing. * = Significant difference between conditions at the same measurement time-point (p<0.05)



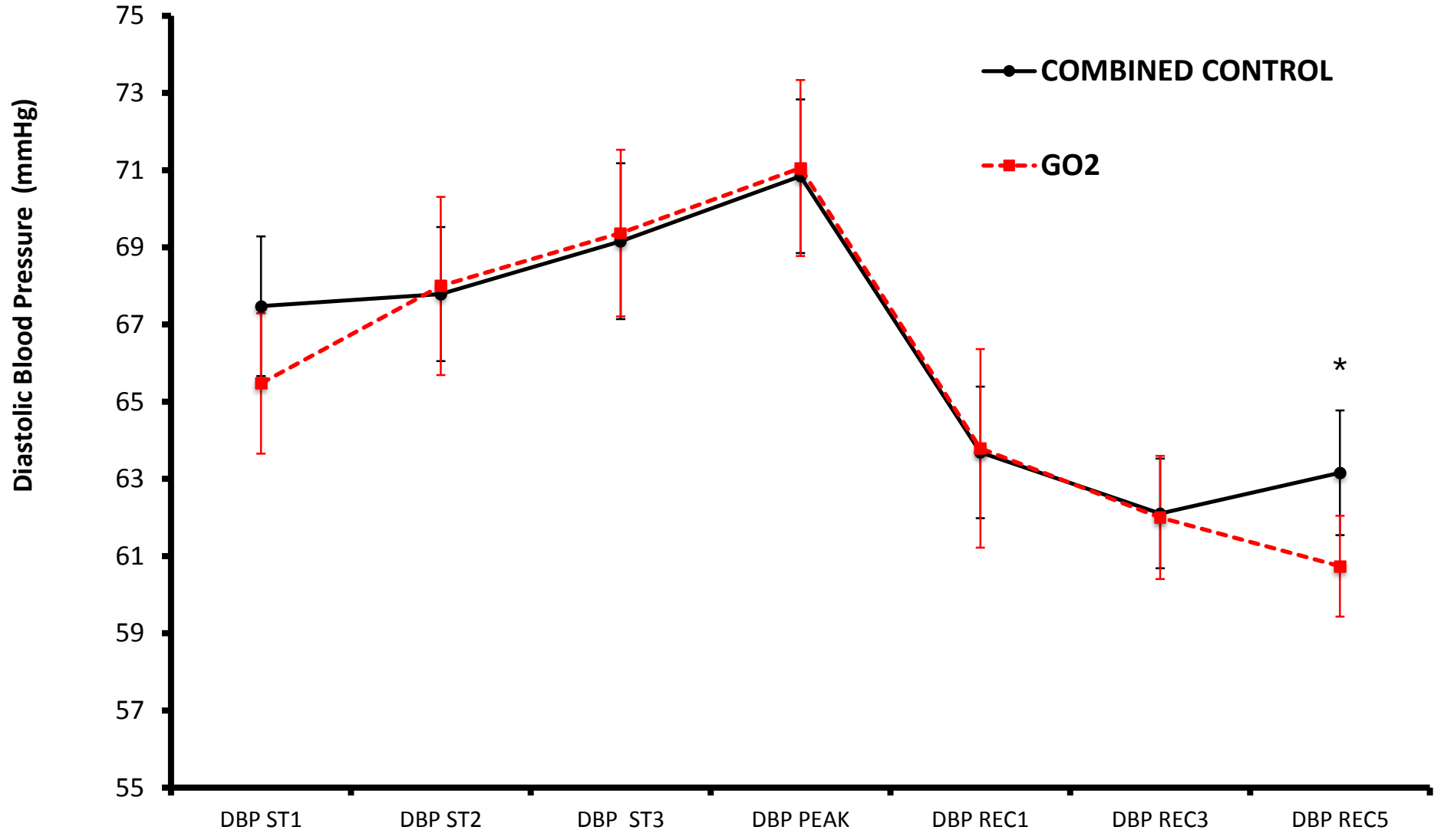
OBRL – GO2 Project Results Summary (Diastolic Blood Pressure)

KEY: Data are presented as means ± standard error for diastolic blood pressure (DBP) measured during graded exercise cycle testing. * = Significant difference between conditions at the same measurement time-point ($p<0.05$)



OBRL – GO2 Project Results Summary (Diastolic Blood Pressure)

KEY: Data are presented as means ± standard error for diastolic blood pressure (DBP) measured during graded exercise cycle testing. * = Significant difference between conditions at the same measurement time-point (p<0.05)



OBRL – GO2 Project Results Summary (Diastolic Blood Pressure)

QUESTION: Does using the GO2 have a significant effect on diastolic blood pressure during GXT compared to control or NO MP?

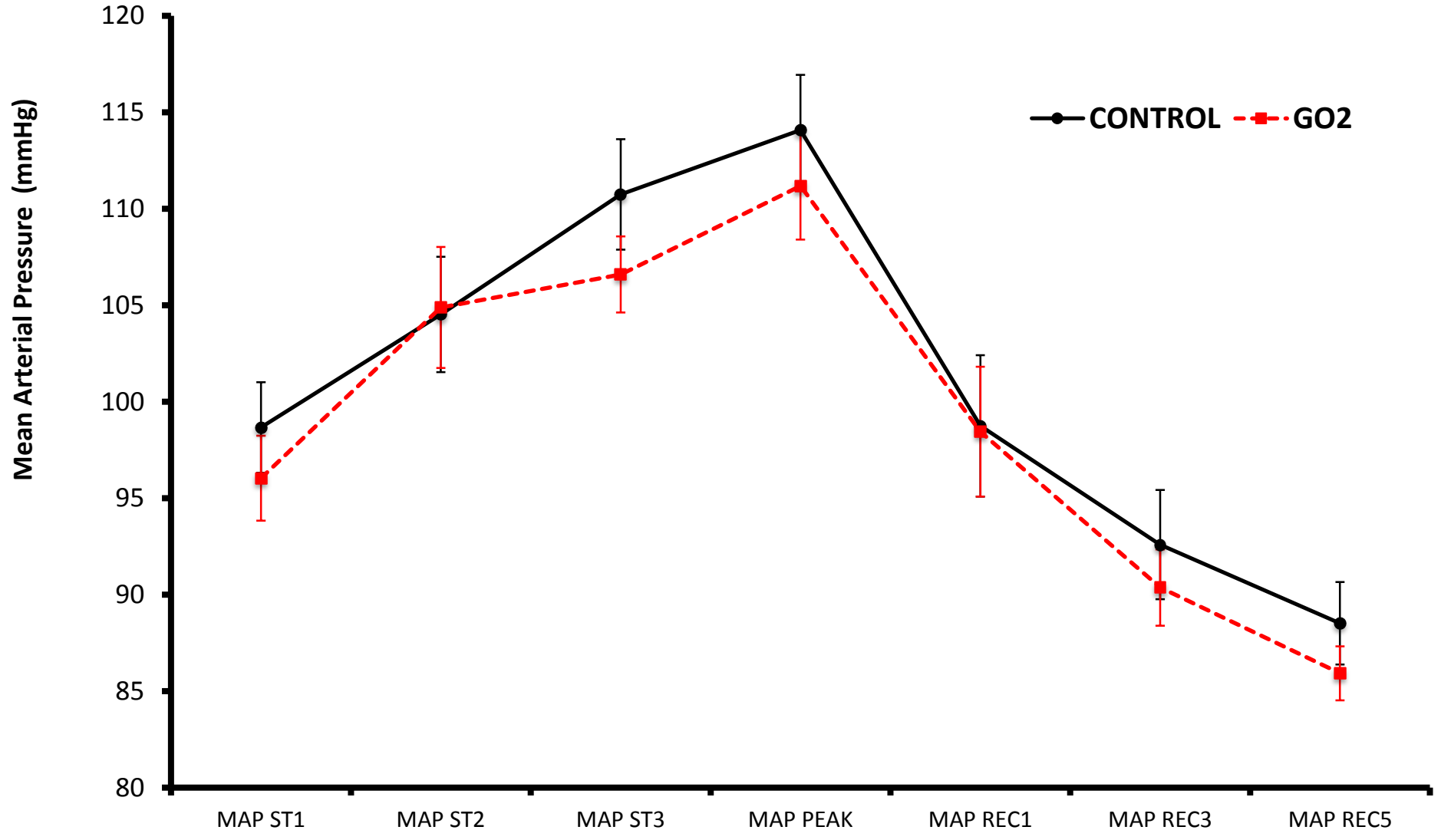
ANSWER: Potentially, DBP was observed to be reduced during stage 1 of GXT when compared to the control MP but not compared to NOMP. When all control data were combined, DBP was observed to be reduced at 5 minutes of recovery.

QUESTION: Does using the GO2 have a significant effect on DBP during SSXT compared to control?

ANSWER: No.

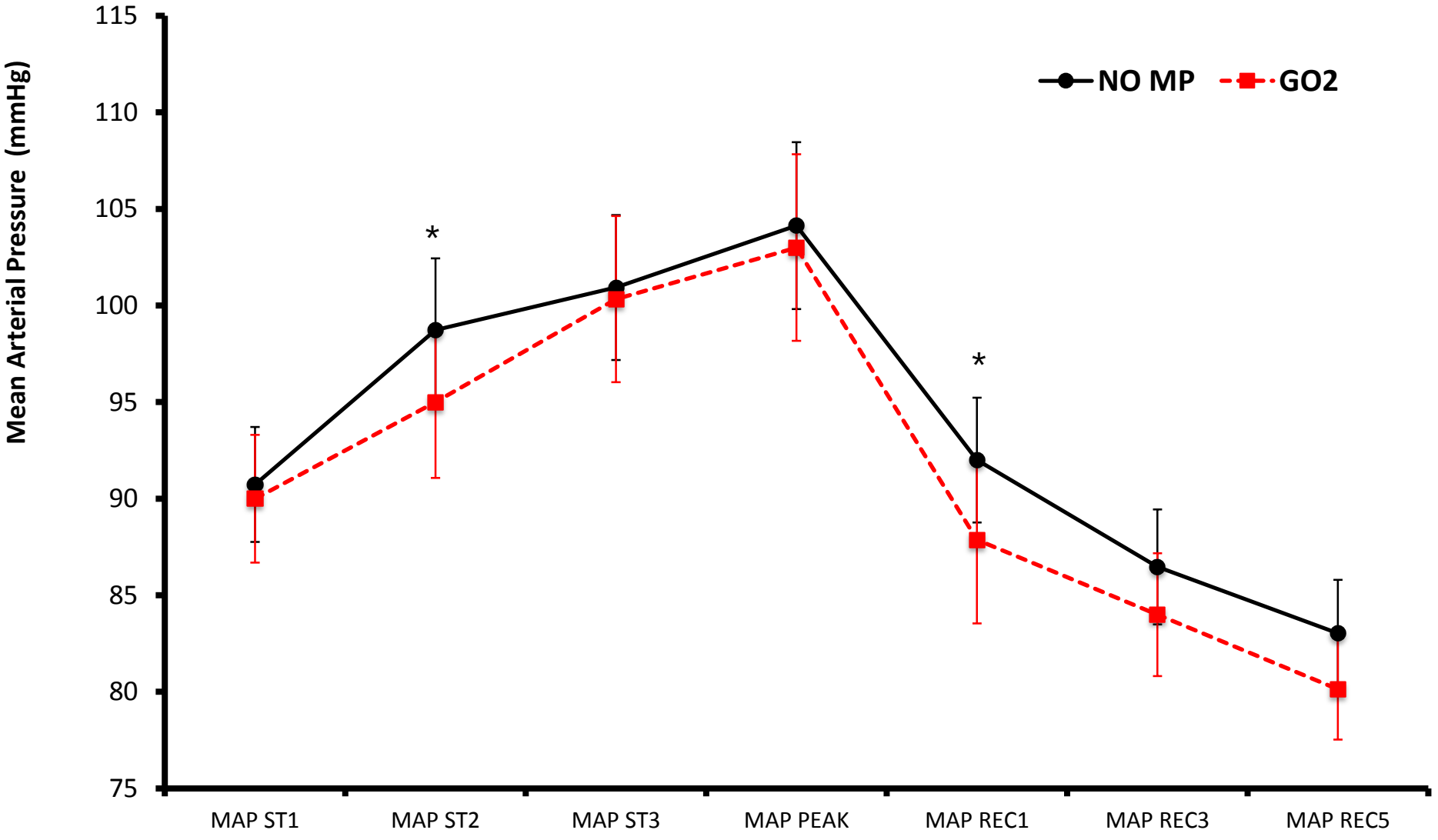
OBRL – GO2 Project Results Summary (Mean Arterial Pressure)

KEY: Data are presented as means ± standard error for mean arterial pressure (MAP) measured during graded exercise cycle testing. * = Significant difference between conditions at the same measurement time-point (p<0.05)



OBRL – GO2 Project Results Summary (Mean Arterial Pressure)

KEY: Data are presented as means ± standard error for mean arterial pressure (MAP) measured during graded exercise cycle testing. * = Significant difference between conditions at the same measurement time-point (p<0.05)



OBRL – GO2 Project Results Summary (Mean Arterial Pressure)

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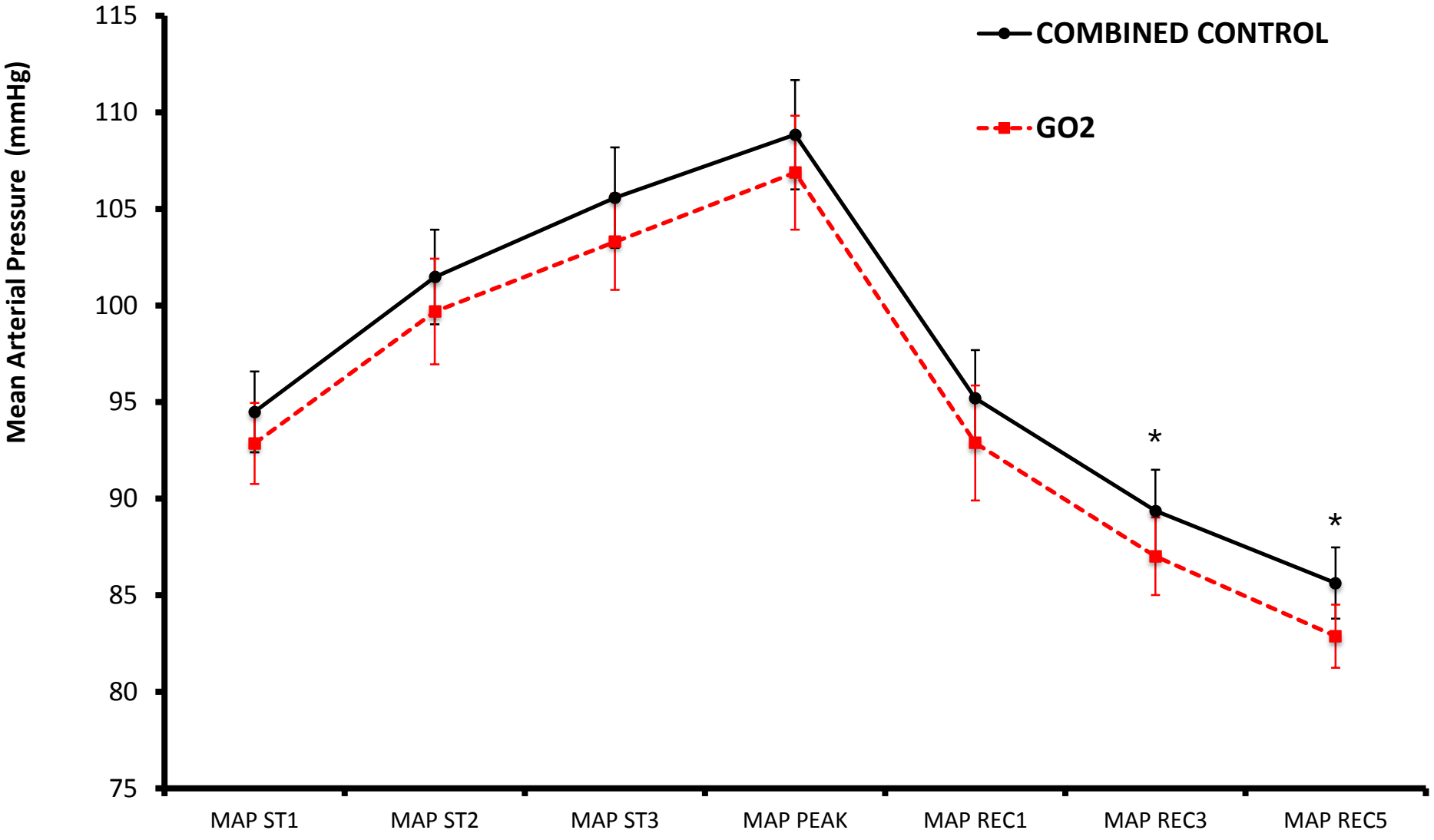


OBRL – GO2 Project Results Summary (Mean Arterial Pressure)

QUESTION: Does using the GO2 have a significant effect on mean arterial pressure during GXT compared to control or NO MP?

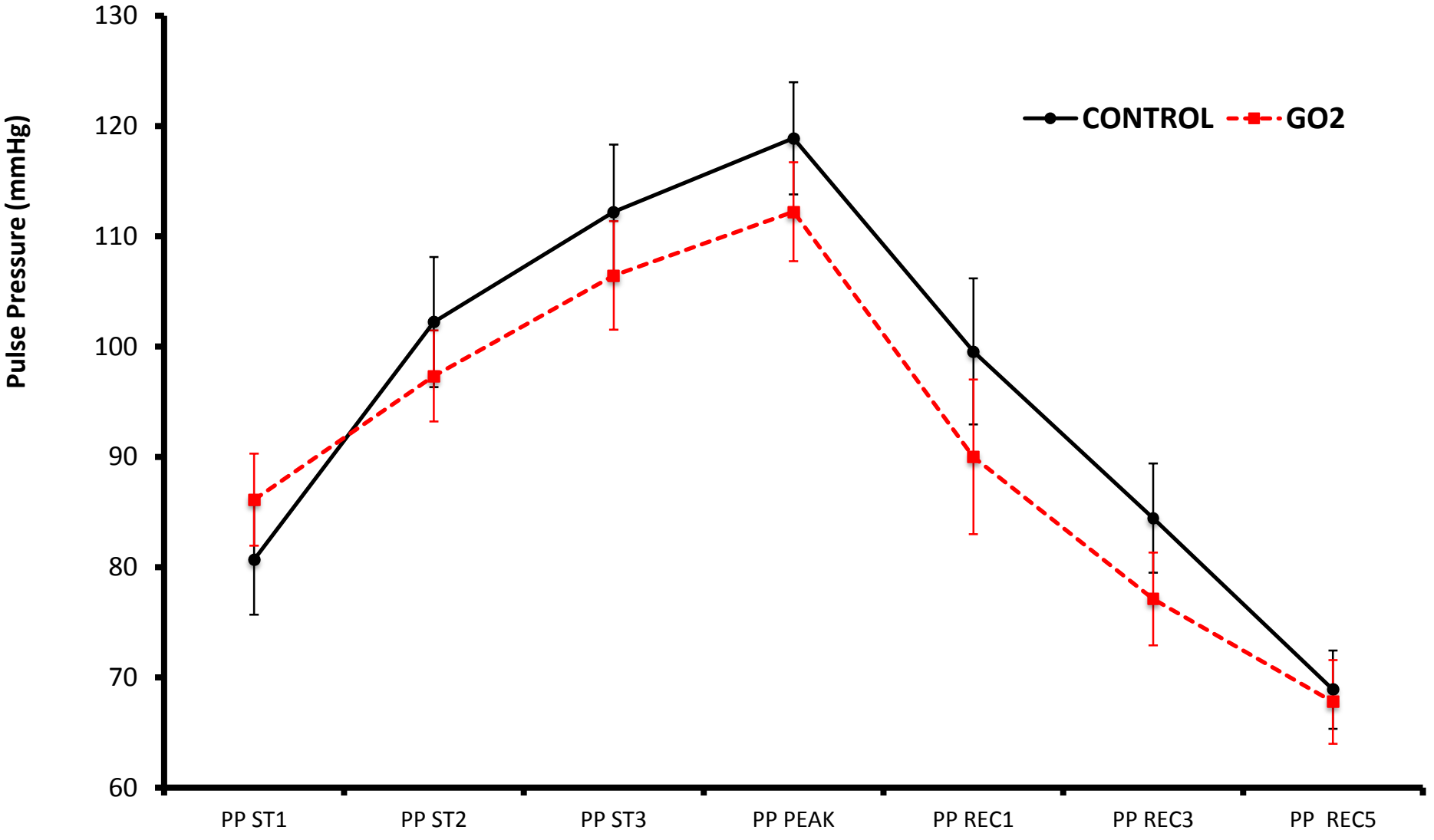
ANSWER: Potentially. MAP was observed to be reduced during stage 2 and at 1 minute of recovery compared to NO MP. When compared to all control data combined, MAP was reduced at 3 and 5 minutes of recovery.

QUESTION: Does using the GO2 have a significant effect on DBP during SSXT compared to control?

ANSWER: NO

OBRL – GO2 Project Results Summary (Pulse Pressure)

KEY: Data are presented as means ± standard error for mean pulse pressure (PP) measured during graded exercise cycle testing. * = Significant difference between conditions at the same measurement time-point ($p<0.05$)



OBRL – GO2 Project Results Summary (Pulse Pressure)

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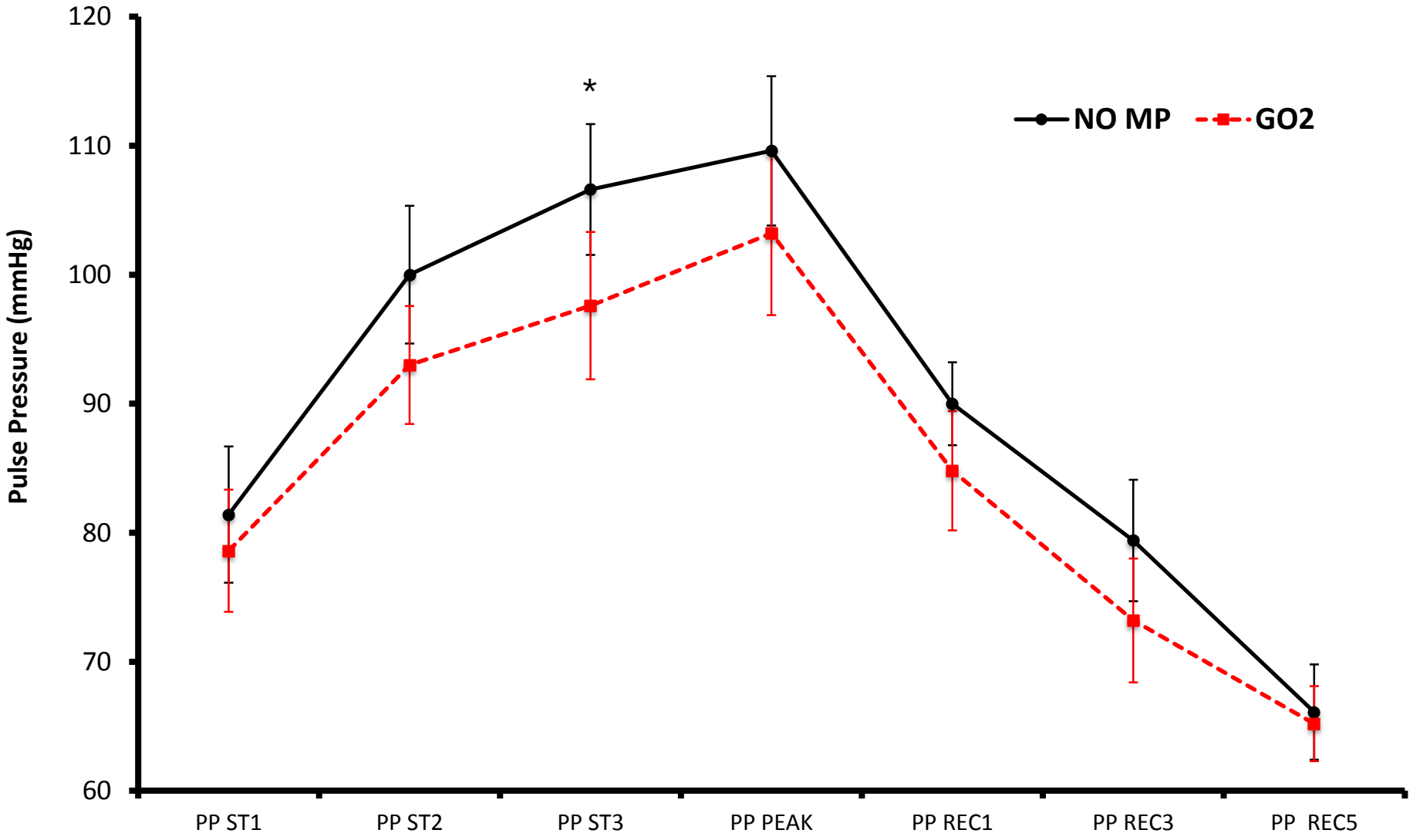

OBRL – GO2 Project Results Summary (Pulse Pressure)

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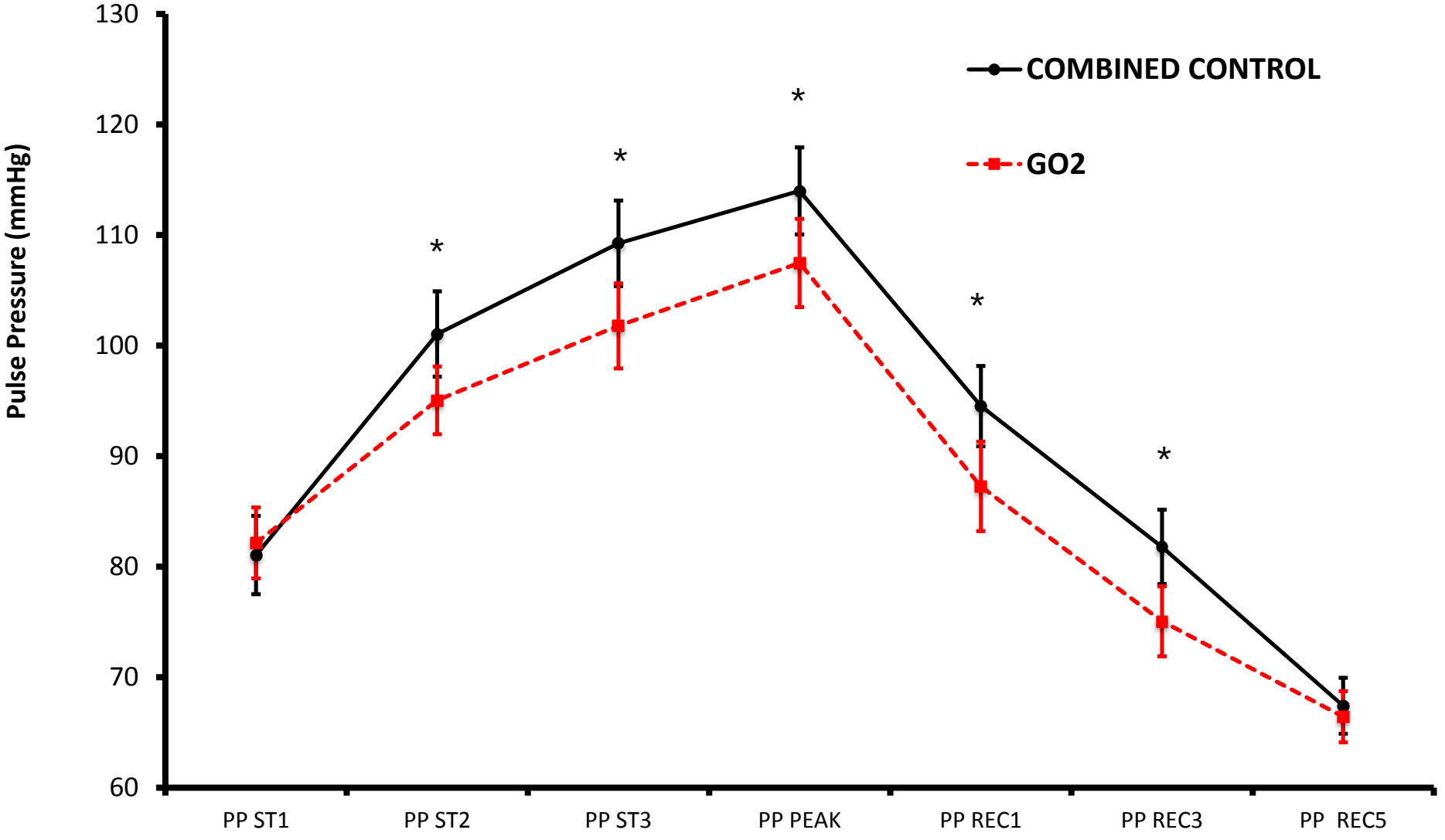


OBRL – GO2 Project Results Summary (Pulse Pressure)

QUESTION: Does using the GO2 have a significant effect on pulse pressure during GXT compared to control or NO MP?

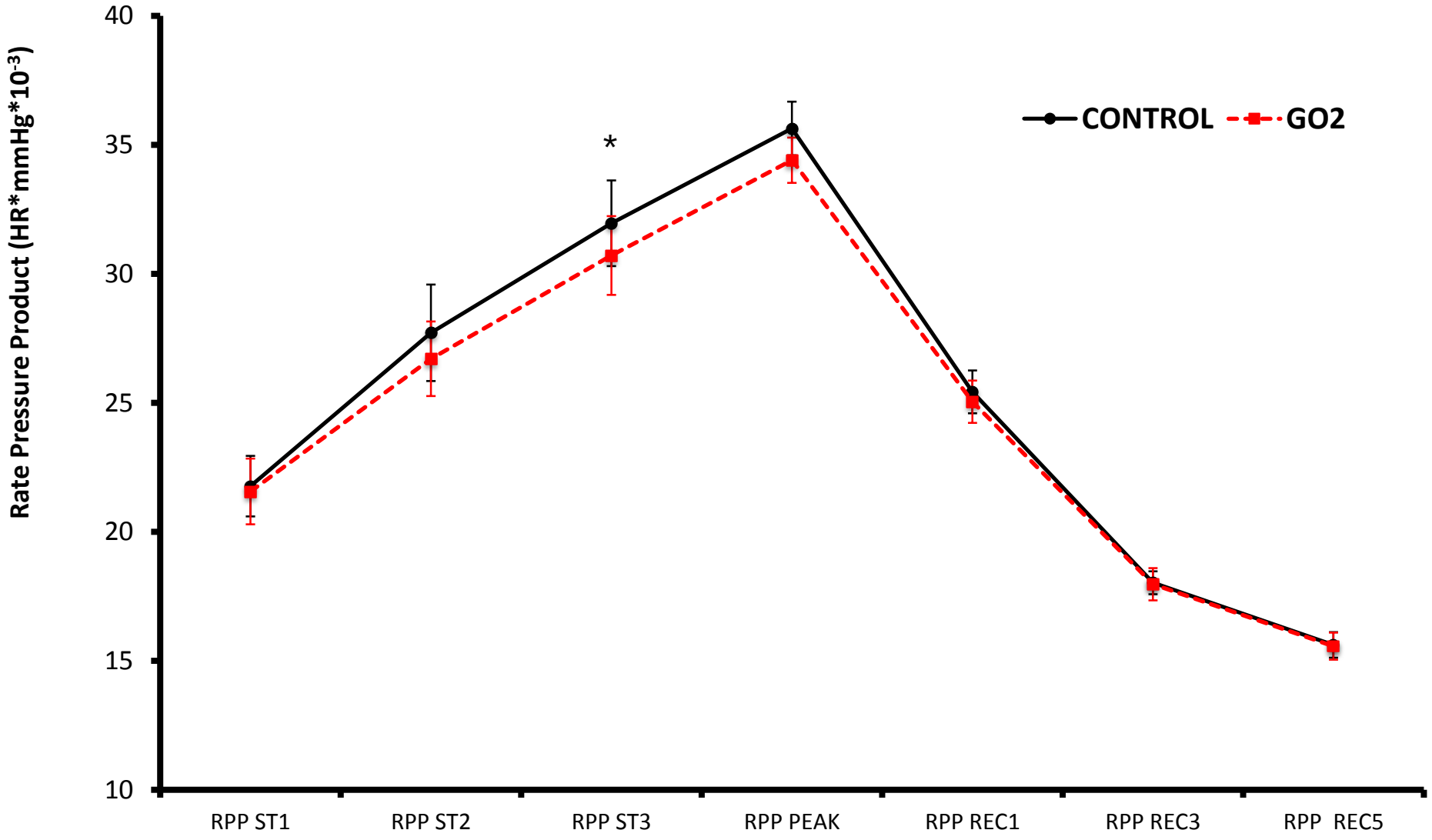
ANSWER: Overall – YES; When comparing GO2 to NO MP or to all control data combined PP appears to be reduced at certain time points during GXT.

QUESTION: Does using the GO2 have a significant effect on DBP during SSXT compared to control or NO MP?

ANSWER: Potentially. Average and Peak PP was observed to be reduced when comparing the GO2 to NO MP during SSXT.

OBRL – GO2 Project Results Summary (Rate Pressure Product)

KEY: Data are presented as means ± standard error for mean rate pressure product (RPP) measured during graded exercise cycle testing. * = Significant difference between conditions at the same measurement time-point (p<0.05)



OBRL – GO2 Project Results Summary (Rate Pressure Product)

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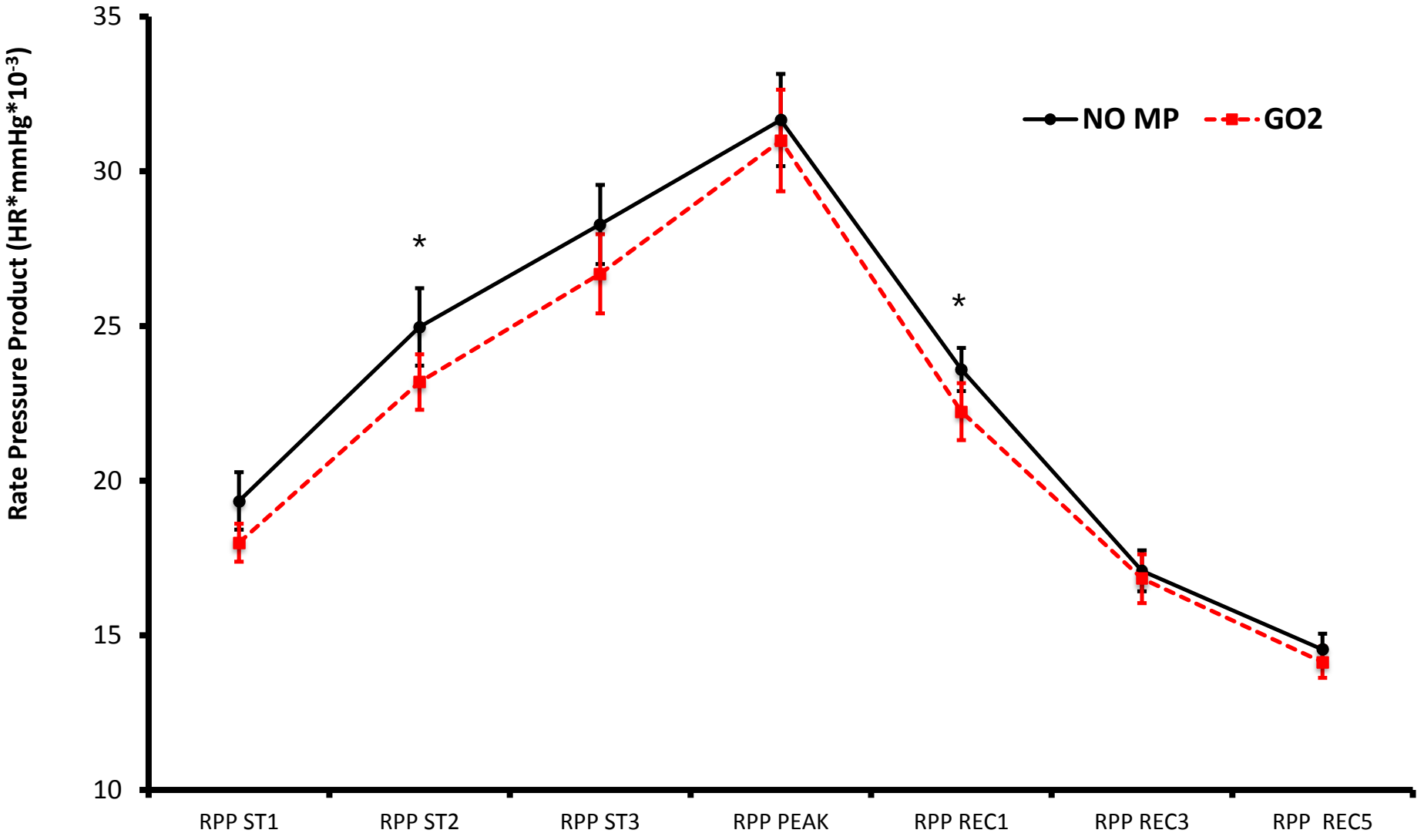

OBRL – GO2 Project Results Summary (Rate Pressure Product)

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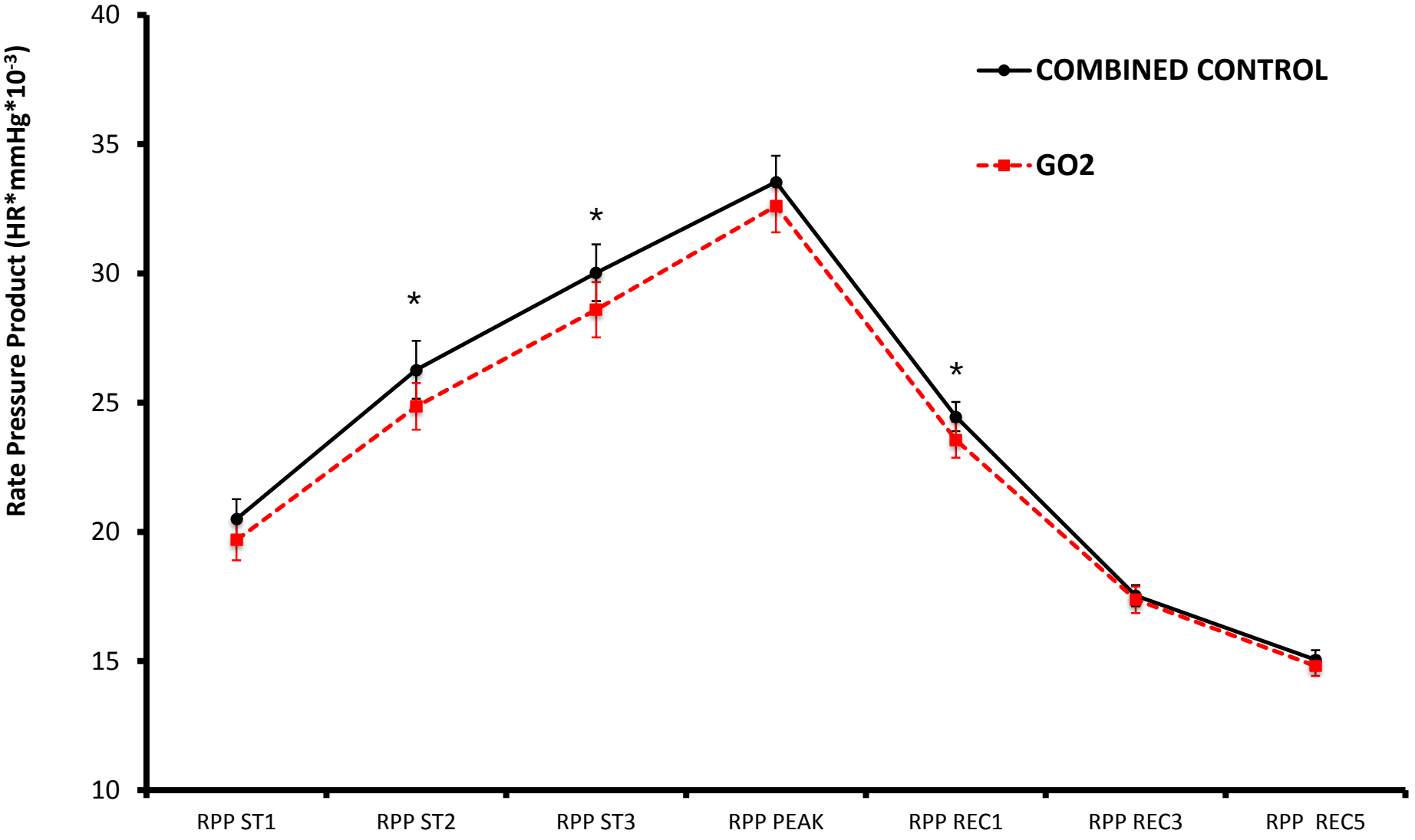
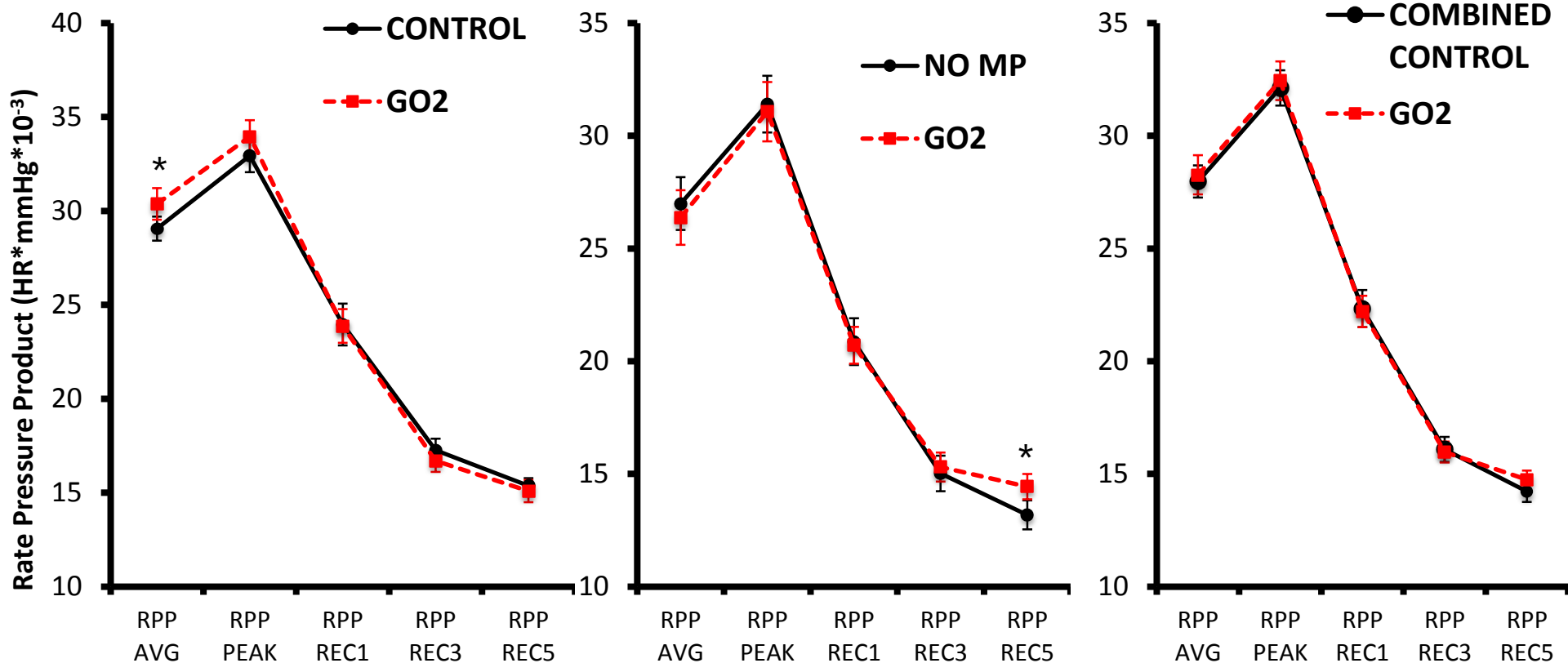


OBRL – GO2 Project Results Summary (Rate Pressure Product)

KEY: Data are presented as means ± standard error for mean rate pressure product (RPP) measured during steady state exercise testing. * = Significant difference between conditions at the same measurement time-point (p<0.05)



OBRL – GO2 Project Results Summary (Rate Pressure Product)

QUESTION: Does using the GO2 have a significant effect on rate pressure product during GXT compared to control or NO MP?

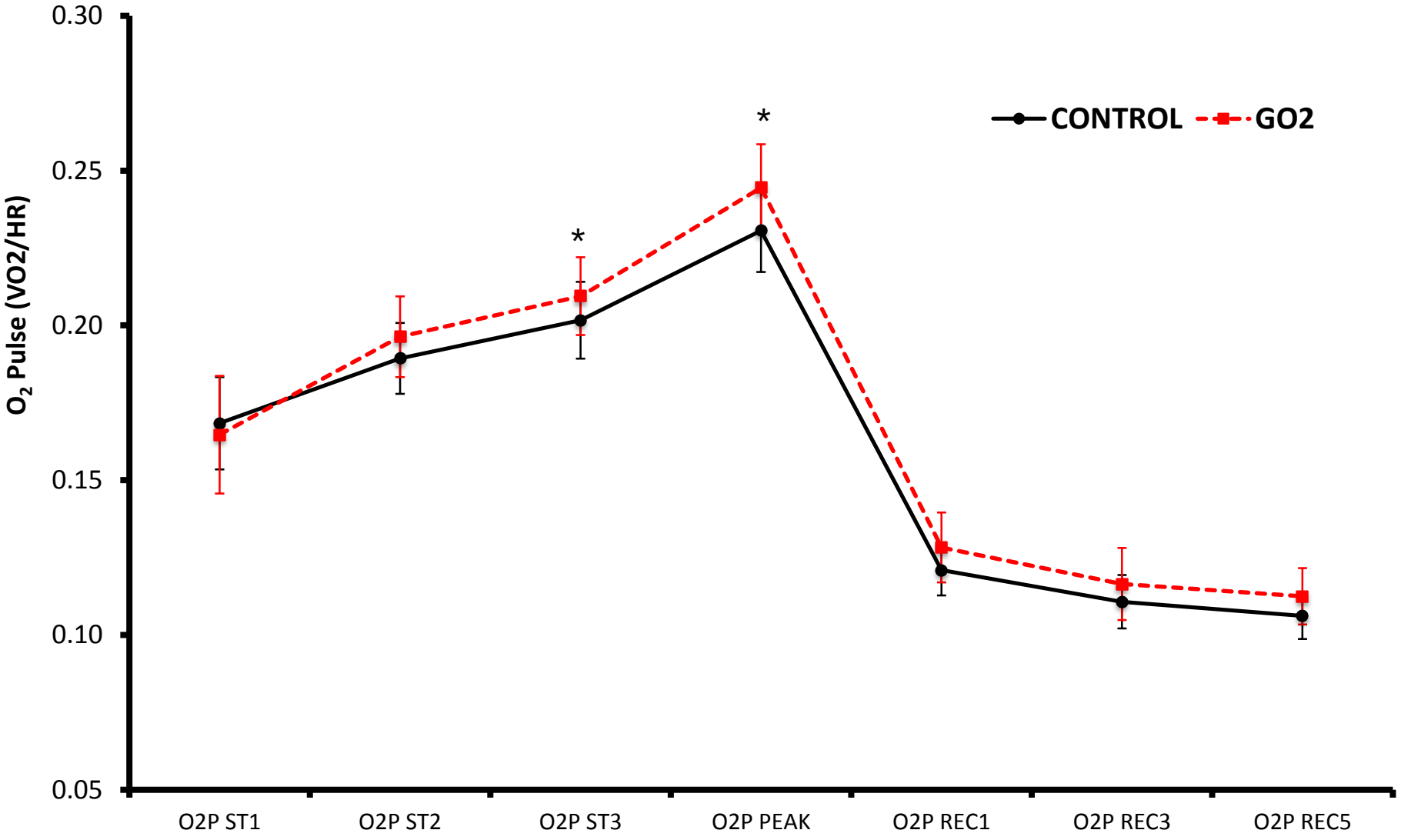
ANSWER: YES. RPP tended to be lower at several stages when comparing GO2 to control, NO MP, or combined controls.

QUESTION: Does using the GO2 have a significant effect on DBP during SSXT compared to control?

ANSWER: Potentially. While mean RPP was higher when comparing GO2 to the control mouth piece, the difference was not observed elsewhere. Compared to NO MP, the RPP was higher at 5min of recovery.

OBRL – GO2 Project Results Summary (O_2 Pulse)

KEY: Data are presented as means ± standard error for mean O2 pulse measured during steady state exercise testing. * = Significant difference between conditions at the same measurement time-point (p<0.05)



OBRL – GO2 Project Results Summary (O_2 Pulse)

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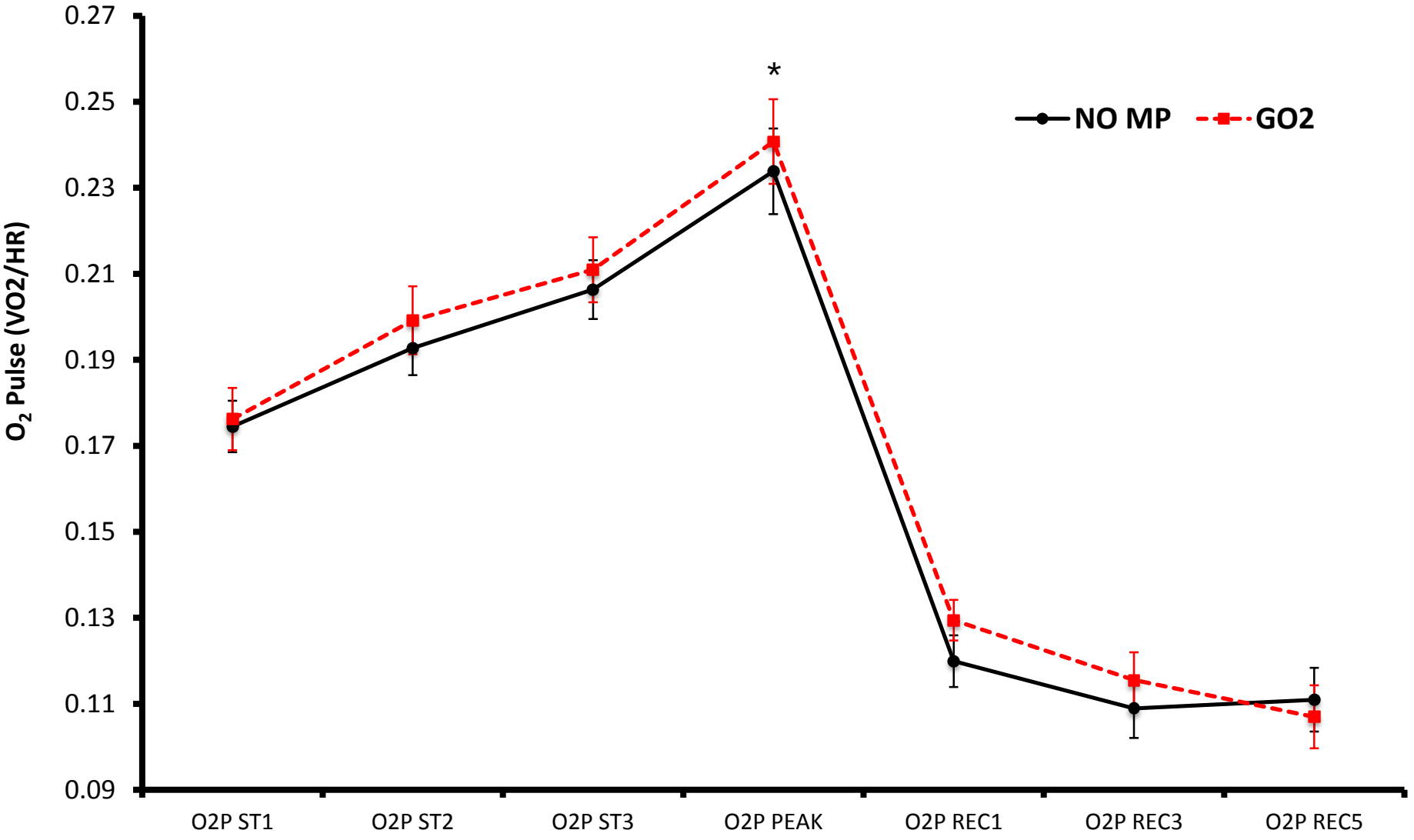

OBRL – GO2 Project Results Summary (O_2 Pulse)

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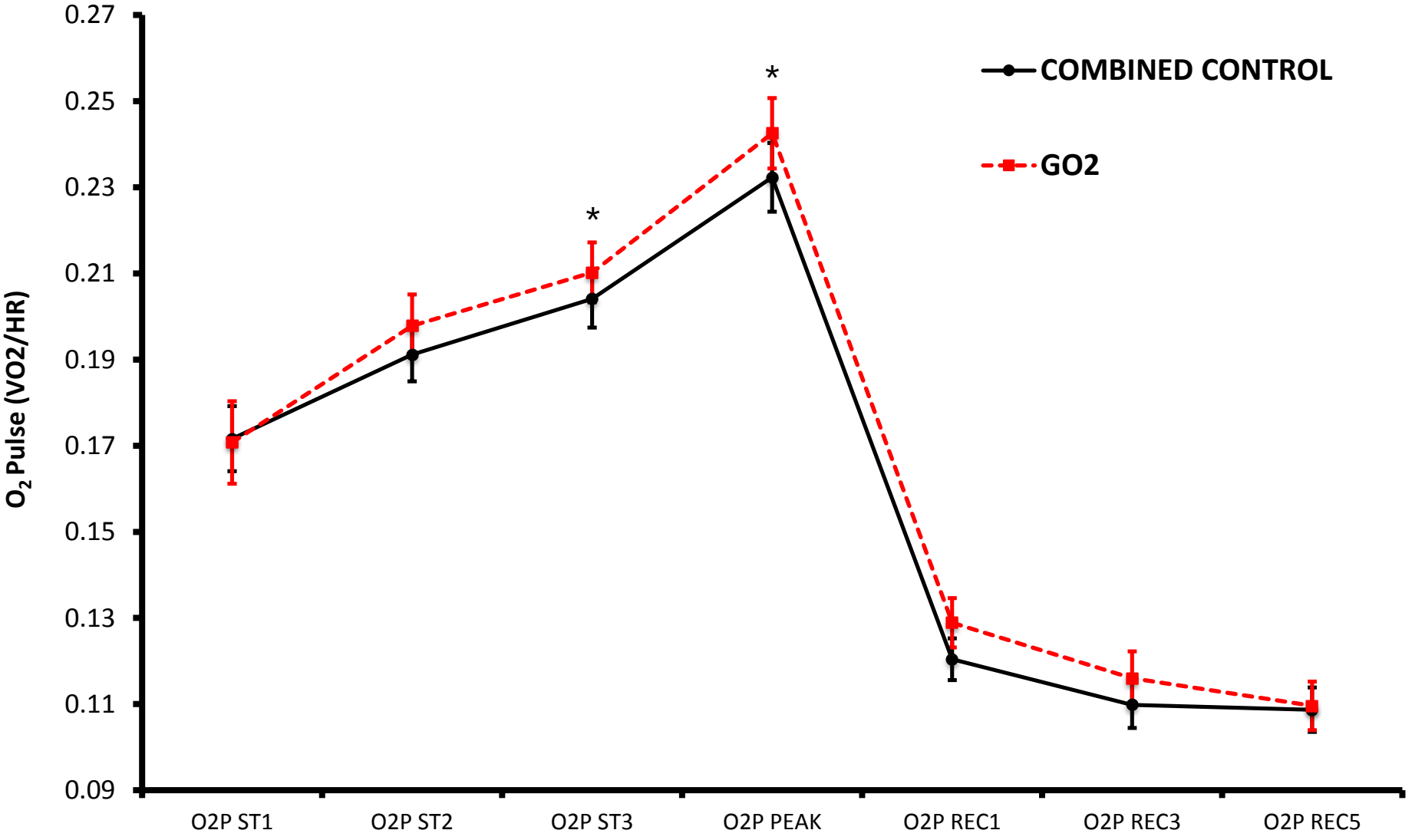

OBRL – GO2 Project Results Summary (O_2 Pulse)

QUESTION: Does using the GO2 during GXT have an effect on O_2 pulse?

ANSWER: Yes, during GXT at high intensity exercise and maximal exercise.

QUESTION: Does using the GO2 during SSXT have an effect on O_2 pulse?

ANSWER: No

OBRL – GO2 Project Results Summary (Perceived Exertion)

QUESTION: Does using the GO2 during GXT OR SSXT have an effect on rates of perceived exertion.

ANSWER: No