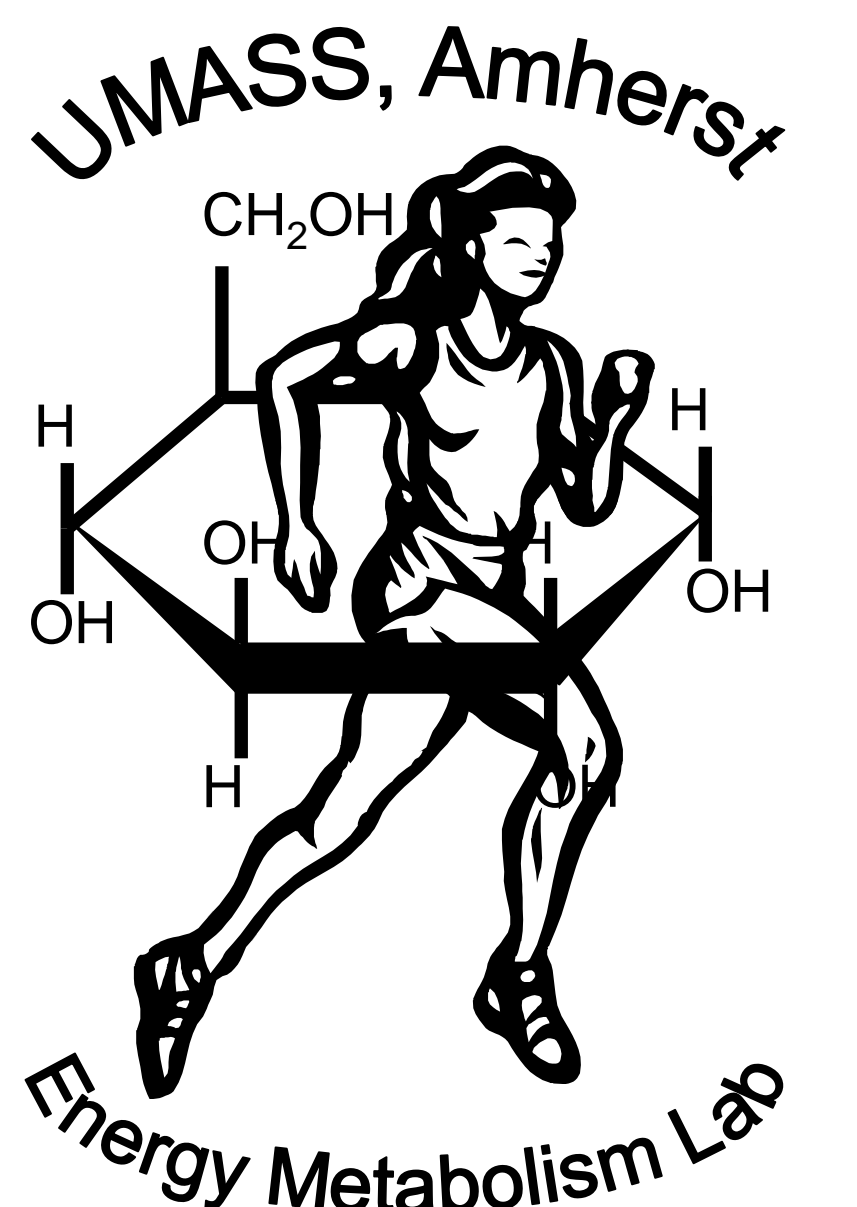




Suppression of Appetite after Exercise: Role of Elevated Body Temperature

Corianne Oliver, Steven K. Malin, Richard Viskochil, Jennifer Rivero, and Barry Braun
 Energy Metabolism Laboratory, University of Massachusetts, Amherst, MA



INTRODUCTION

- Weight management is in part regulated by appetite regulating hormones.
- Ghrelin is a peptide hormone released from the stomach prior to eating and stimulates appetite. After meals peptide YY (PYY) is released from intestinal cells, suppressing appetite.
- Exercise can contribute to weight loss because it inhibits ghrelin and stimulates PYY.
- There is evidence of an association between the rise in core body temperature during exercise and the suppression of appetite.
- Energy intakes following exercise in a neutral or cool environment (i.e., swimming pool) are significantly higher compared to exercise in a warm environment.
- All current studies on core body temperature and appetite regulation involve exercise.
- The effects of exercise on appetite may actually be due to the associated rise in core body temperature rather than the exercise itself.

PURPOSE

- **Purpose:** To determine the effects of exercise and core body temperature on appetite perception and appetite regulating hormones.
- **Hypothesis:** Appetite perception and appetite regulating hormones will respond to changes in core temperature rather than the presence or absence of exercise.
- **Significance:** This study may influence exercise recommendations designed to facilitate weight management.

METHODS

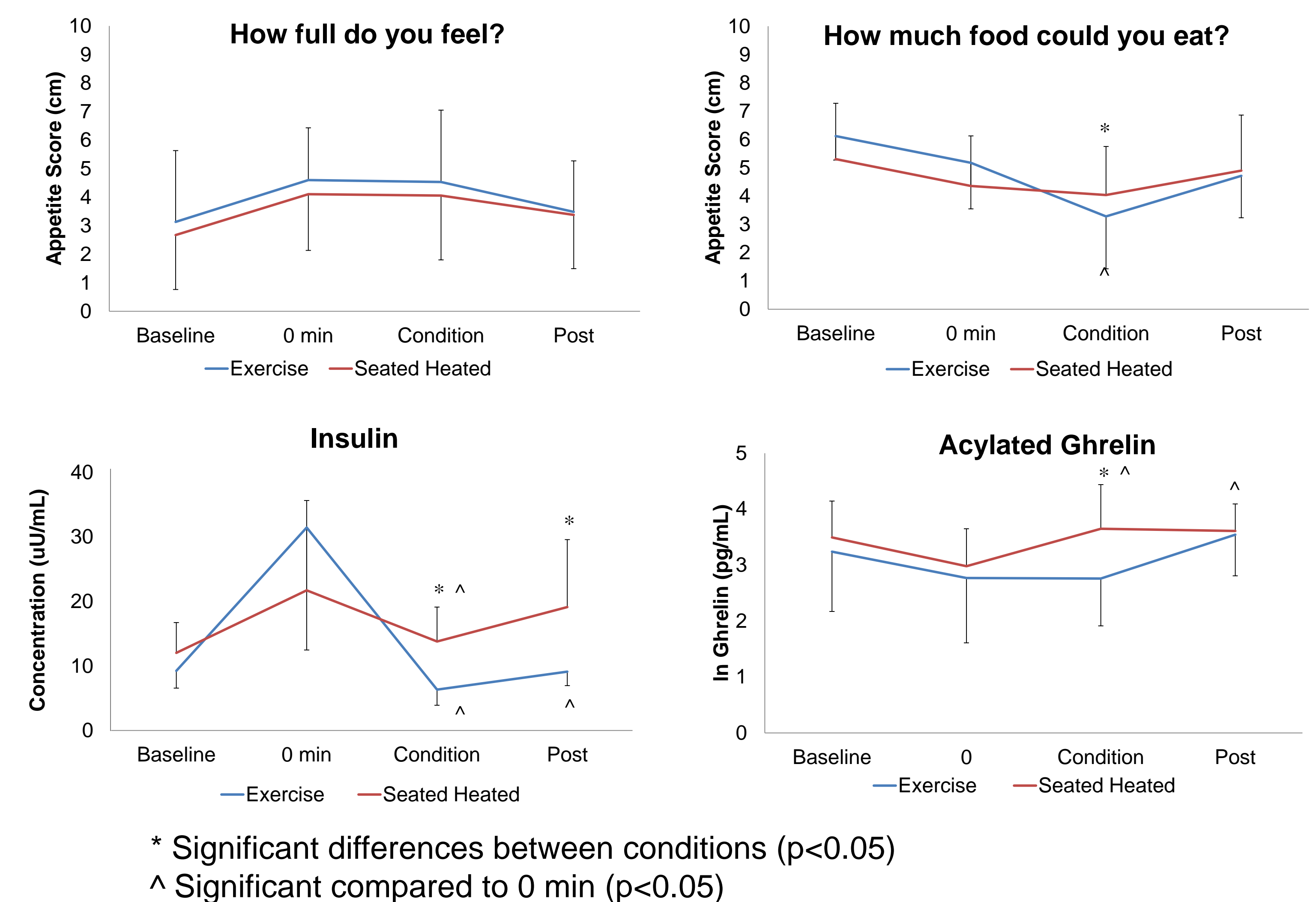
- **Subjects:** 5 healthy, recreationally active individuals (3 men, 2 women, see Table 1).
- **Protocol:** Participants first completed exercise in a neutral environment (Ex), followed by a non-exercise, seated-heated condition (SH).

Table 1. Subject Characteristics.

	Males (n=5)	Females (n=5)
Age (yr)	21.0	21.6 ± 1
Height (cm)	182 ± 7.2	166 ± 5.3
BMI (kg/m ²)	23.8 ± 1.7	23.7 ± 2.3
Waist Circumference (cm)	82.3 ± 7.0	74.5 ± 2.1
Fasting Glucose (mg/dL)	88.2 ± 7.8	90.4 ± 9.8
Blood Pressure (mmHg)	121/73	111/73
Resting Heart Rate (bpm)	66 ± 12.0	60 ± 13.8
VO ₂ peak (L/min)	4.2 ± 0.5	3.2 ± 0.6
VO ₂ peak (mL/kg/min)	52.8 ± 1.6	49.6 ± 3.1

- Visit 1: Anthropometric measures (height, body weight, waist circumference), blood pressure and heart rate were taken in the morning following an 8-10 hour fast.
- To assess maximal aerobic capacity, subjects performed an incremental VO₂ peak test on a cycle ergometer.
- All foods and drinks consumed the night before were recorded. To assess core temperature, subjects ingested a VitalSense thermometer capsule 8 hours prior to the morning visit.
- Subjects consumed an energy bar (240 kcals, 70% carbohydrate, 15% protein, 15% fat) 60 minutes before each condition.
- Visit 2, exercise condition: Subjects exercised at 70% of their VO₂ peak for 45 minutes on a cycle ergometer in a neutral environment (20°C).
- Visit 3, seated-heated condition: Subjects remained seated for 45 minutes, and were heated with a sauna suit and heated blanket.
- Appetite surveys were given and blood was drawn prior to consuming the energy bar, and throughout the condition at 0 min, 30 min, 45 min, post 15 min and post 30 to assess appetite perception and appetite hormones (insulin, ghrelin, PYY) respectively.

RESULTS



CONCLUSIONS & FUTURE DIRECTIONS

- Exercise, independent of changes in core temperature, suppressed circulating ghrelin and insulin; however there was no similar suppression regarding appetite perception.
- The appetite regulating hormones ghrelin and insulin respond to exercise, while appetite perception may partly be responding to changes in core temperature.
- An exercise condition where core temperature is suppressed could be used in future studies to further evaluate the differences in appetite hormones and perception in relation to core body temperature and exercise. A larger follow-up study would be beneficial to determine if the effects of core body temperature on appetite suppression influence weight changes over a longer period of time.
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