

## ENERGY EXPENDITURE: IS HIGH INTENSITY INTERVAL TRAINING (HIIT) BETTER THAN CONTINUOUS AEROBIC TRAINING?

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### Abstract

High Intensity Interval Training (HIIT) has been pointed as an efficient method for cardiorespiratory enhancement in comparison with traditional continuous aerobic training (CAT). Such difference is believed to be explained by assessing the energy expenditure of training sessions. Hence, in order to test this hypothesis, it was realized an acute intervention in recreationally active young men during three experimental conditions with a cross-over design. Energy expenditure results indicate that it is highly correlated with exercise volume, and even though energetic systems contribution during HIIT and CAT sessions were different, total caloric expenditure were similar between exercises sessions.

### Keywords:

*Aerobic training, energy expenditure, Interval Training*

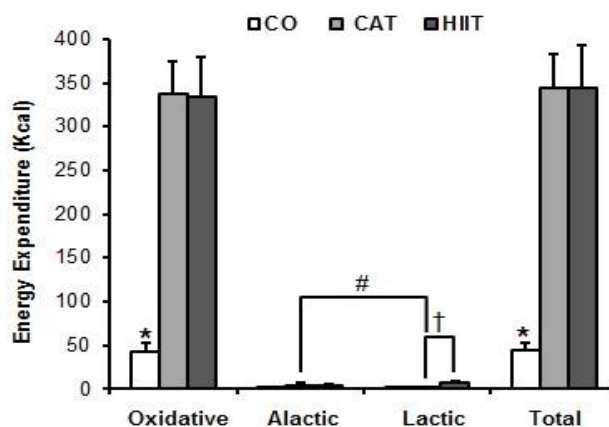
### Introduction

Continuous aerobic training (CAT) is a traditional well established method of cardiorespiratory enhancement<sup>1</sup>. Nevertheless, high intensity interval training (HIIT) has shown more efficient results for cardiorespiratory enhancement in comparison with CAT<sup>2</sup>. HIIT is characterized by high intensity exercise stimulus interspersed with rest or low intensity active rest intervals<sup>3</sup>. Considering the differences between these two types of training, it is supposed that different metabolic pathways and energy production mechanisms are utilized. Thus, we hypothesized that energy production derived from anaerobic pathway during HIIT is greater than during CAT, which would result in an increase of session energy expenditure. Those results would help to understand the mechanisms by which HIIT can be more efficient for cardiorespiratory enhancement based on a contribution of energetic systems approach.

### Results and Discussion

Seven young men (18-30 years old) were submitted to three acute experimental sessions: Control Session (CO, 40 min of rest), CAT (40 min at 70% of Heart Rate Reserve (HRR)) and HIIT (40 min with 5 bouts of 4 min at 90% of HRR intercalated with 3 min at 50% of HRR). The contribution of the energy systems of training methods was calculated by GEDAE-LAB software<sup>4</sup>. It was utilized an analysis of variance (ANOVA) of repeated measures for comparisons within and between experimental sessions. Significance level was 5% ( $P < 0.05$ ).

It was observed a greater energy expenditure of oxidative system in comparison with alactic and lactic systems in all sessions ( $P < 0.001$ ). During CAT session there was a greater alactic that lactic energy contribution ( $P = 0.036$ ). There was a greater energy expenditure of all sources during HIIT and CAT sessions in comparison to control (CO) session ( $P < 0.001$ ), and a greater lactic energy expenditure in comparison to CAT and CO sessions ( $P = 0.003$ ). Total energy expenditure was similar between CAT and HIIT sessions, although greater than CO session ( $P < 0.001$ ).



**Figure 1.** Energy Expenditure. \*  $P < 0.05$  vs. HIIT and CAT. #  $P < 0.05$  between Lactic and Alactic CAT. †  $P < 0.05$  between Lactic HIIT and Lactic CAT.

### Conclusion

We concluded that, based on study conditions, energy expenditure between sessions was similar. This indicates that greater cardiorespiratory adaptations commonly observed after HIIT in comparison to CAT cannot be attributed to greater energy expenditure during HIIT sessions. Likewise, other physiological variables, such as different metabolites expression or oxygen consumption after exercise are suggested to better explain the differences at promoted adaptations by both training methods.

### Acknowledgements

FAEPEX, FISEX and LABFEF-FEF-UNICAMP.

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<sup>4</sup> BERTUZZI, R.; et al. GEDAE-Lab: A Free Software to Calculate the Energy System Contributions during Exercise. *PLoS One*, v. 11, n. 1, p. 1-13, 2016.