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METABOLOMIC ANALYSIS OF PREDICTOR MOLECULAR BIOMARKERS OF RESPIRATORY FITNESS IN HYPERTENSIVE WOMEN

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Abstract

Sedentary living habits contribute to a significant decrease in levels of cardiorespiratory fitness, which is associated with increased mortality for all causes and cardiovascular diseases, such as hypertension. Aerobic training leads to changes in maximal oxygen consumption and physiological patterns and determinants. Metabolomics, an emerging technology in the field of the omic sciences has shown to be an important methodology of analysis that gives a more individual perspective,since the responses to training have a wide variation. The present study aims to identify changes in metabolic profile and metabolic pathways associated with responses of cardiorespiratory fitness through aerobic training in hypertensive women.

Key words:

Hypertension; Cardiorespiratory Fitness,Metabolomics.

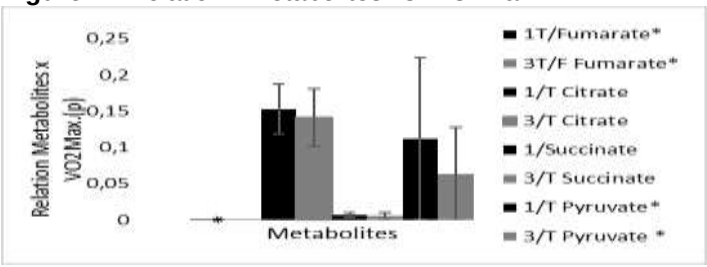
Introduction

Hypertension and low level of cardiorespiratory fitness (CRF) are highly associated with the appearance of cardiovascular diseases. CRF can be improved through continuous aerobic training (CAT), being measured by maximal oxygen consumption (VO_2Max) values. However, although most individuals achieve several benefits with aerobic training, there is a wide interindividual variability in this response. Previous studies have used the “omic sciences” to understand this variability, searching for predictive molecules of CRF. An emerging “omic” technology that has been used is the metabolomics, that is the identification of the metabolites, molecules representing the cellular biochemical status of several biological materials. Studies in this field have shown differences in the metabolic profile for different CRF levels. Associations between baseline metabolism and intrinsic CRF, demonstrated a combination of metabolites that were able to explain VO_2Max variability supporting the use of metabolomics as a tool to identify predicting biomarkers of changes in CRF.

Results and Discussion

Subjects (hypertensive, menopausal women) were submitted to a VO_2Max test and a 12 week CAT on cycle ergometers. After selecting 16 blood samples that were colleted before starting the intervention, a relation between a few Kreb’s Cycle intermediary and glycolitic pathway metabolites with VO_2Max was made, in order to explain responsiveness to CAT. Individuals were divided in tertiles based on the values of their VO_2Max test.

Figure 1. Relation - Metabolites vs. VO_2Max.



*Significant Relation ($p<0.05$)

Table 1. Subjects Characteristics (1^{st}/ 3^{rd}Tertile Mean±SD.)

Variables	1^{st} Tertile	3^{rd} Tertile
Age	59,4 ±6,4	53,9±3,3
Body Mass (kg)	94,6± 19	82,6±12,5
Height (cm)	165,6± 4,8	159,8 ± 8,5
BMI (kg.m-2)	34,61± 5,5	32,1± 6,6
Fat Body Mass (%)	51,6±4,6	43,9±6,8
VO_2Max. (ml/kg/min)	14,7±1,7	22,07±1,7

BMI= Body Mass Index; VO_2 Máx. = Maximal Oxygen Consumption

Conclusions

In the statistical analysis, there was only a significant relation when it comes to Fumarate and Pyruvate compared to VO_2Max.

Fumarate concentrations can be explained by the Urea Metabolism, and Pyruvate may be related to a higher utilization of the glycolitic pathway in rest. Both of them may be used as indicators of higher blood pressure.

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