

Exploratory Study of Metabolomic Profile in Individuals with Spinal Cord Injury

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Abstract

The main causes of death in SCI subjects are connect with cardiovascular diseases, confirmed by intimal carotid layer stiffness, Metabolic Syndrome thru fat accumulation in the torso, upper body and caquexia and inflammation caused by physical inactivity (MATOS-SOUZA et al. 2009; MARUYAMA et al. 2008; MYERS et al. 2007; FROST et al. 2005; MANN et al. 2005). We analyzed the blood samples of 29 athletes with disabilities and compared with sedentary subjects, that belong to the same group of disabilities, paraplegics and tetraplegics. Using the metabolomics technique we were able to identify small molecules in the blood samples that in conjunction form a profile which characterize a group.

Key words:

Metabolomics, Spinal Cord Injury, Exercise..

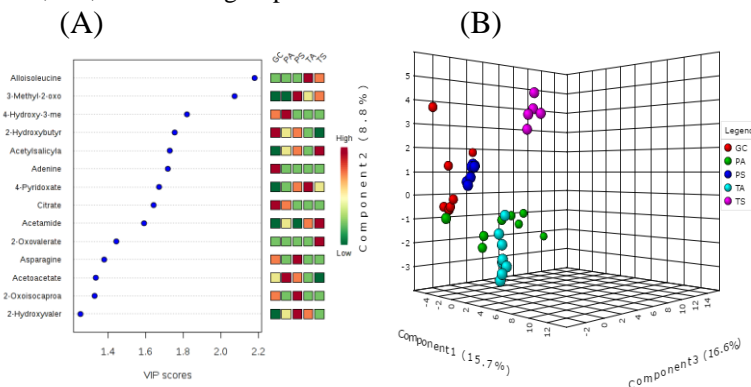
Introduction

The incidence of Spinal Cord Injury (SCI) in Brazil is about 6 - 8 thousand per year(1). Physical exercise has been shown a powerful mechanism to attenuate the deleterious effect of SCI and all your mortality causes, like cardiovascular diseases, Metabolic Syndrome and Inflammation(2). Thus the aim of this project was to investigate, by means of an exploratory study, the overall metabolic response due to the exercise in individuals with SCI. The sample was a group of 37 subjects and 16 paraplegics, 8 Athletes (PA) and 8 sedentary (PS) 13 quadriplegics, 8 Athletes (TA) and 5 sedentary (TS) and 8 sedentary subjects without disabilities (GC). For the analysis of the data was used the technique of partial least squares discriminant analysis for (PLS-DA) that provide a quick view of the similarities or differences in metabolites dataset(3). We used a 600MHz Varian Inova, Nuclear Magnetic Resonance Machine.

Results and Discussion

Blood samples were collected after fasting for 12 hours for the analysis of clinical, and part of the blood was used for the metabolomic analysis. For the analysis of the data was used the technique of partial least squares discriminant analysis for (PLS-DA) that provide a quick view of the similarities or differences in metabolites dataset. We found 14 metabolites with VIP SCORE above 1.2 and are primarily responsible for the separation between the 5 groups in order of importance these are: Alloisoleucine, 3-Methyl - 2 oxovalerate, 4-Hydroxy - 3 Methoxymandelate, 2 -Hydroxubutirate, Acetylsalicylate, adenine, 4-Piridoxate, Citrate, Acetamide, 2-Oxovalerate, Asparagine, acetoacetate, 2-Oxoisocaproate, 2-Hydroxyvalerate. For confirm the VIP SCORE results we did Tukey's post-hoc test.

Image 1. (A) VIP SCORE; (B) 3D Metabolomic Profile of GC, PA, OS, TA and TS groups.



Conclusions

We have concluded that the exercise was capable of change the metabolomic profile of SCI subjects who are engaged in to a physical exercise program.

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