

## EFFECT OF ISOLOAD ACUTE EXERCISE WITH DIFFERENTS VOLUME AND INTENSITY MANIPULATIONS OVER MUSCLE AND HEPATIC GLYCOGEN STORES IN SWIMMING RATS.

André V. Cordeiro (IC), Lucas D. M. Forte (PG) e Fúlvia B. Manchado-Gobatto (PQ).

### Abstract

This study aimed to investigate the effect of an acute exercise bout performed on intensities below, at and above the anaerobic threshold (but at the same total workload) over the muscle and liver glycogen stores. For that, after determination of anaerobic threshold by lactate minimum test, rats were divided in six groups: GC, G90, G100, G110 and G120 (control and exercised at 90, 100, 110 and 120% of anaerobic threshold). Rats were euthanized immediately (0h) and four hours after exercise bout. The results demonstrated significant glycogen depletion in liver when exercise is performed in high intensities (G110 and G120). Also, despite only observed 4h after exercise, glycolytic muscle (gluteus) had significant reductions in glycogen content for exercised groups. Our results suggests that despite performed on isoload, high intensities are more dependent of glucose metabolism, and mainly when considered hepatic and white muscle tissues.

*Key words: Anaerobic threshold, isoload efforts, glycogen depletion.*

### Introduction

It is well known that exercise performed at different intensities require different metabolic demand. However, there is a lack in literature regarding exercise performed at aerobic and anaerobic predominance but at the same total workload (isoload), and its effects over metabolism.

Thus, the present study aimed to investigate the effect of an acute isoload exercise bout performed on intensities below, at and above the anaerobic threshold (AnT) over the muscle and hepatic glycogen stores.

Here we demonstrated for the first time that acute isoload exercise performed near the aerobic-anaerobic transition zone in fact promotes different requirement of energy demand, reflected in glycogen depletion, one of the most important substrate reserve (BECK et al., 2014). As expected, glycogen depletion was more evidenced during efforts of anaerobic predominance as well as in glycolytic predominant tissue.

In addition, we demonstrated that glycogen depletion is a very sensitive metabolic parameter after exercise, since it was not fully recovered 4h after 4h acute effort (mainly in liver).

### Results and Discussion

After AnT determination by the lactate minimum test (DE ARAÚJO et al., 2007), rats were divided in six groups: GC, G90, G100, G110 and G120 (control and exercised at 90, 100, 110 and 120% of AnT). Animals from G80 to G120 exercised for 37.5, 33.3, 30, 27.3 and 25 minutes respectively. Ten rats of each group were euthanized immediately and four hours after exercise.

Results of glycogen content after exercise are shown in table 1. Glycogen stores were depleted in liver for rats exercised at high intensities (G110 and G120). Also, 4h after exercise, glycolytic muscle (gluteus) had significant reductions in glycogen content for exercised groups.

**Table 1.** Results of muscle and liver glycogen content (mg.100mg<sup>-1</sup>) after acute exercise at different time of samples collection (0h and 4h after exercise).

	Gastro	Gluteus	Liver	Gastro	Gluteus	Liver
	4h	4h	4h	0h	0h	0h
GC	0.47±0.24	0.53±0.2	1.66±0.82	0.32±0.25	0.25±0.21	2.03±0.75
G80	0.32±0.06	0.35±0.16*	0.63±0.32*	0.31±0.19	0.19±0.06	1.59±0.58
G90	0.42±0.22	0.40±0.19*	1.47±1.14	0.33±0.2	0.18±0.08	1.24±0.62
G100	0.36±0.1	0.36±0.06*	1.27±0.52	0.28±0.18	0.15±0.02	1.41±0.98
G110	0.34±0.08	0.34±0.07*	0.78±0.2*	0.25±0.15	0.19±0.1	0.77±0.5*
G120	0.31±0.05	0.35±0.06*	0.83±0.29*	0.28±0.19	0.37±0.3	0.98±0.83*

\* p < 0.05 in comparison to control group (GC).

### Conclusions

Our results suggests that despite performed on isoload, high intensities are more dependent of glucose metabolism, and mainly when considered hepatic and white muscle tissues.

### Acknowledgement

We would like to thank FAPESP (process 2014/10336-9) and CNPq (process 442934/2014-9) for financial support.

### References

DE ARAÚJO, G.G.; PAPOTI, M.; MANCHADO, F.B.; MELLO, M.A.R.; GOBATTO, C.A.. *Comp Biochem Physiol.* v 148, n 4, 2007  
BECK, W.R.; RIBEIRO, L.F.P.; SCARIOT, P.P.M.; REIS, I.G.M.; GOBATTO, C.A. *Science & Sports*, v 29, n 6, 2014.