

## FOOD PEPTIDE BIOACTIVITY ON THE HEAT SHOCK PROTEIN SYSTEM IN RATS

Ligia S. Perrucio (IC), Carolina S. Moura (PG), Pablo C. B. Lollo (PQ), Priscila N. Morato (PQ), Jaime Amaya-Farfan (PQ).

### Abstract

Heat shock protein (HSP) is responsible for protecting cells from the damaging effects of various stressors and maintaining normal cell function, but the role of foods to this effect is little known. Whey protein hydrolysate (WPH) bioactive peptides have been suggested to induce HSP production. The aim was to determine which WPH-peptides could modulate the HSP response. Fifty-six Wistar rats were divided into seven groups: control, vehicle, Isoleucyl-leucine (Ile-Leu), Leucyl-isoleucine (Leu-Ile), Valyl-leucine (Val-Leu), Leucyl-valine (Leu-Val) and WPH. Leu-Val increased the HSP70, HSP90 and HSP25 muscle expression and restored the expression of antioxidant system, while Ile-Leu increased the HSP70 and HSP60. These results indicated that Leu-Val is most likely involved in the WPH-induced stimulation of the HSP upregulation and antioxidant response. Additionally, Ile-Leu could also contribute to the WPH effect.

*Key words: milk, HSP, protection.*

### Introduction

Whey protein hydrolysate (WPH) enhances exercise-induced heat shock proteins (HSPs) expression. It is possible that the hydrolyzed form of whey protein contained bioactive peptides with the ability to enhance HSP expression. HSPs are a complex physiological defense mechanism that confer higher tolerance and cell resistance and may promote cell survival during periods of stress<sup>1,2,3</sup>. The objective was to investigate the effect of bioactive peptides known to be present in the WPH on HSPs production.

### Results and Discussion

Leu-Val peptide increased the HSP70, HSP25 and HSP90 muscle expression and exhibited the largest antioxidant response. Ile-Leu stimulated HSP70 and HSP60. The increase in HSPs content has been shown to provide cytoprotection to skeletal muscle against stress from exercise and some forms of muscle damage, improving post-exercise recovery of striated muscle<sup>3</sup>. It is believed that the development of new strategies and procedures that may increase the expression of HSPs would be of practical relevance<sup>1,2,4</sup>. This is the first study that shows innovative cell-protecting role of food protein-derived bioactive peptides present in milk.

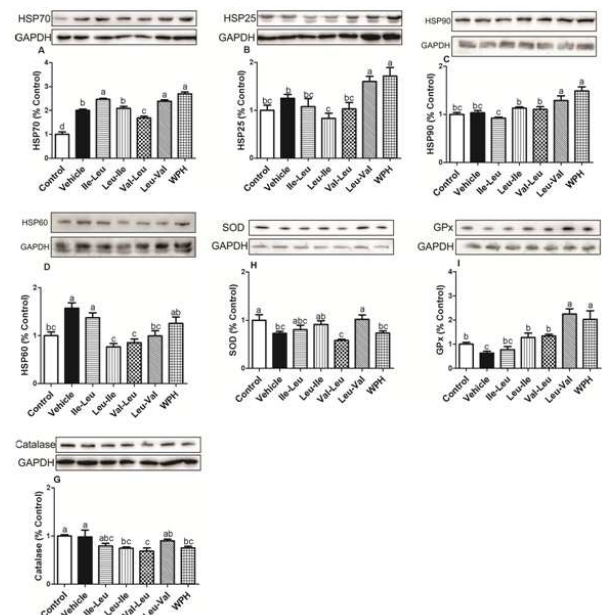


Image 1. HSP and antioxidant system

### Conclusions

The results indicate that the Leu-Val peptide is most likely involved in the WPH-induced stimulation of HSP upregulation. Moreover, the Ile-Leu could also contribute to the protective effect of WPH.

### Acknowledgement

FAPESP n°2013/02862-0,2013/06494-5) and CNPq for financial support.

<sup>1</sup> Santoro, M. G. *Biochem Pharmacol.* **2000**, 59, 55.

<sup>2</sup> Lanneau, D.; Brunet, M.; Frisan, E.; Solary, E.; et al. *J Cell Mol Med.* **2008**, 12, 743

<sup>3</sup> Maglara, A. A.; Vasilaki, A.; Jackson, M. J.; McArdle, A. J. *Physiol.* **2003**, 548, 837.

<sup>4</sup> Khassaf, M.; Child, R. B.; McArdle, A.; Brodie, D. A.; Esanu, C. et al. *J Appl Physiol.* **2001**, 90, 1031. .