EFFECTS OF LEPTIN ON ADIPOGENESIS, PARTICIPATION OF CAVEOLIN-1 AND LIPID DROPLETS
LOHANNA PALHINHA DO AMARAL¹, PATRÍCIA T. BOZZA¹, CECÍLIA J. DE ALMEIDA¹, CLARISSA M. MAYA-MONTEIRO¹.
¹Laboratório de Imunofarmacologia, Departamento de Fisiologia e Farmacodinâmica, Instituto Oswaldo Cruz (IOC), Fundação Oswaldo Cruz (FIOCRUZ) - Rio de Janeiro/RJ, Brazil.

Introduction and Objectives Leptin is produced by mature adipocytes and has central and peripheral effects. It signals in the hypothalamus that the energy balance is positive, and, therefore, contributes to the sensation of satiety and stimulates energy expenditure and activation of the immune system. Caveolin-1 is a protein essential for the formation of caveolae, which are membrane invaginations involved in compartmentalization of signaling pathways, lipid flux and metabolism. They are present abundantly in lipid droplets, which stores neutral lipids and compartmentalize proteins involved in inflammation. Lipid droplets are found in virtually all cell types and their formation is stimulated by various factors, such as leptin. This project aims to analyze the interplay between leptin, caveolin-1 and lipid droplets, in addition to their influences in lipid metabolism during adipogenesis and inflammatory pathways in macrophages, preadipocytes and adipocytes in vitro.

Methods and Results We cultured 3T3-L1 and Raw 264.7 cells. Differentiated and undifferentiated 3T3-L1 cells were incubated with leptin for different times and we saw by immunoblot that leptin modulates the expression of caveolin-1, ADRP and Perilipin - structural proteins of lipid droplets - in these cells. Leptin also modulates the content of neutral lipids based on Oil Red O extraction. Incubation of 3T3-L1 cells with the supernatant of non-stimulated Raw 264.7 cells also modulates caveolin-1 and ADRP expression. It suggests that some factor produced by macrophages may interfere with lipid metabolism and inflammatory pathways in 3T3-L1 cells, possibly through caveolae.

Conclusions The results obtained show that leptin alters the expression of caveolin-1, ADRP and Perilipin, as well as the hyperplasia and hypertrofia of lipid droplets. Macrophage-derived factors also seem to interfere with the expression of caveolin-1. These findings may be important for the development of future therapies for obesity.

Keywords: leptin; lipid droplets; caveolin-1.

Acknowledgements: CNPq, PIBIC, CAPES-SUS, FAPERJ, FIOCRUZ.