BOOK OF ABSTRACTS

8TH MEETING OF YOUNG RESEARCHERS
OF UNIVERSITY OF PORTO

U.PORTO

"Browning" of White Adipocytes: Melanocortins as Essential Players

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White adipose tissue (WAT) is specialized in energy storage whereas brown adipose tissue (BAT) burns fat to produce heat via an uncoupled metabolism [1]. The discovery of beige or brown-like cells within WAT [2] set off the conversion of white into brown adipocytes as an attractive option in the management of obesity. Beige adipocytes arise by transdifferentiation of white adipocytes when subjected to certain conditions, such as chronic β-adrenergic stimulation and exposure to cold. It is known that the melanocortin neuropeptides have a lipolytic effect in white adipocytes [3] and promote thermogenesis in brown adipocytes [4], but it was not yet described their role in the transdifferentiation of white to beige/brown adipocytes, and that was the aim of this study.

For this, 3T3-L1 adipocytes were stimulated with the melanocortin alpha-MSH and the expression of the browning hallmark genes uncoupling protein 1 (UCP-1) and peroxisome proliferator-activated receptor-gamma coactivator 1 alpha (PGC-1α) and the WAT characteristic gene resistin was measured through real time PCR. It was observed an upregulated expression of UCP-1 and PGC-1α and a decreased expression of resistin mRNA. To evaluate mitochondria biogenesis, which is increased in brown adipocytes, the binding of the fluorochrome 10-N-nonyl acridine orange to mitochondria membrane was measured. Data revealed that 3T3-L1 adipocytes, stimulated with alpha-MSH for 24h, present a significantly higher content of mitochondria. In accordance, oxygen consumption, measured in a Clark-type electrode, indicated that melanocortin treatment increases the total oxygen consumption rates (OCR) and improves uncoupled OCR in 3T3-L1. These results are in accordance with a higher UCP1 expression. In conclusion, the melanocortin alpha-MSH induces beige/brown adipocyte characteristics in 3T3-L1 adipocytes.

Acknowledgments: SFRH/BPD/92868/2013 and Tanita Healthy Weight Community Trust

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