

EXTRA-VIRGIN OLIVE OIL POLYPHENOLS OLEOCANTHAL, OLEACEIN AND HYDROXYTYROSOL DECREASE ADIPOCYTE INFLAMMATION

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Introduction: Inflammation of adipose tissue plays an important role in the development of many chronic diseases associated with obesity. Polyphenols are naturally occurring antioxidants and integral components of the healthful Mediterranean diet. They promote health through many mechanisms including anti-inflammatory activities. In particular, some polyphenols of extra virgin olive oil (EVOO) including secoiridoids, oleocanthal (OC) and oleacein (OA), and simple phenols, such as hydroxytyrosol (HT), are responsible for many nutraceutical characteristics of EVOO. However, their role in obesity-associated adipocyte inflammation and related microRNAs (miRNAs) deregulation has not been fully elucidated. In this study, we investigated the impact of OC, OA and HT on the expression of genes and miRNAs associated with inflammatory and dysmetabolic responses in human adipocytes.

Material and methods: Fully differentiated Simpson-Golabi-Behmel syndrome (SGBS) adipocytes were pre-treated with EVOO polyphenols before stimulation with TNF-. Levels of mRNA gene expression as well as cell and exosomal miRNAs were measured by real-time PCR.

Results: We identified three miRNAs (miR-155-5p, miR-34a-5p and let-7c-5p) deregulated by TNF- α in both human adipocytes and in related exosomes. Interestingly, the miRNAs modulation by TNF- α was significantly counteracted by EVOO polyphenols. In agreements with miRNAs modulation, EVOO polyphenols significantly reduced the mRNA expression of genes implicated in adipocyte inflammation (IL-1 β , COX-2), angiogenesis (VEGF, MMPs), oxidative stress (NADPH oxidase subunits), leukocytes chemotaxis and infiltration (MCP-1, CXCL-10, MCS-F).

Discussion and conclusion: This study demonstrates, for the first time, that polyphenols isolated from EVOO (OC, OA and HT) counteract the expression of inflammatory miRNAs in adipocytes and adipocyte-derived exosomes and concomitantly modulate the expression of pro-inflammatory genes, showing a protective profile. Therefore, these compounds could be novel dietary tools for the prevention of inflammatory diseases associated with obesity.