

POSTER

NUTRACEUTICAL-MEDIATED EFFECTS IN THE MODULATION OF INFLAMMATORY PROCESSES IN AN *IN VITRO* MODEL OF HUMAN ENDOMETRIAL STROMAL CELLS

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The endometrial microenvironment is governed by a delicate equilibrium between inflammatory signaling and redox homeostasis, both essential for physiological processes such as tissue remodeling and decidualization. However, the transition from physiological signaling to chronic inflammation and oxidative stress represents a primary barrier to reproductive success. Excessive accumulation of reactive oxygen species (ROS) and pro-inflammatory microenvironment impair the molecular dialogue required for endometrial receptivity and follicle development. These alterations are frequently exacerbated by metabolic dysfunctions, such as insulin resistance (IR), which further compromise the functional integrity of human endometrial stromal cells (HESC). In this context, we investigated the potential protective role of nutraceutical substances, specifically the Oleoylethanolamide analog AM3102 and Quercetin (Q), in counteracting

inflammation and metabolism-induced cellular dysfunctions. HESCs were exposed either to an inflammatory microenvironment mediated by Interleukin-1 β (IL-1 β) or to metabolic alteration via chronic insulin exposure (IR). Our findings demonstrate that both AM3102 and Quercetin promote the nuclear translocation of NRF2, a master regulator of anti-oxidant and anti-inflammatory responses. ROS quantification and mitochondrial tracking analyses, revealed a significant reduction in oxidative stress and modulation of mitochondrial dynamics. RT-PCR analysis indicated a modulation of the pro-inflammatory cytokine profile, while Western Blot analysis demonstrate the modulation of signaling pathways involved in both inflammatory and IR metabolic responses. Preliminary data obtained in human granulosa cells, confirm a similar cytoprotective profile, showing a marked reduction in ROS levels and further supporting the antioxidant efficacy of these nutraceutical compounds.