

## GLIADIN AND ADIPOSE INFLAMMATION, ANTI-INFLAMMATORY AND PROTECTIVE EFFECTS OF DIET-DERIVED FLAVONOIDS

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**Introduction:** Adipose tissue plays a pivotal role in energy balance and metabolic homeostasis, but it was recognized as complex endocrine organ that regulates energy expenditure, glucose metabolism and systemic health. An excess of triglycerides accumulation causes a development of adipose tissue dysfunction characterized by activation of inflammatory pathways and secretion of pro-inflammatory adipokines, such as IL-6 and TNF $\alpha$ . Gliadin, a fraction of gluten, was recognized to induce chronic inflammation because it alters immune cell composition and inflammatory phenotype of visceral adipose tissue. Natural compounds, such as flavonoids, possess anti-inflammatory activity since they are able to reduce the expression of pro-inflammatory cytokines, modulating the inflammatory response involved in several diseases. The aim of this study was to evaluate the anti-inflammatory effects of flavonoids on the gluten-induced inflammation in white adipocytes.

**Materials and methods:** 3T3-L1 cells were differentiated into white adipocytes under appropriate culturing conditions. White adipocytes were treated with 1 mg/mL of gliadin for 24 hours to induce the typical inflammatory phenotype of adipose tissue; cells were treated with flavonoids for 24 hours. At the end of the treatment, cells were collected and used for molecular analyses.

**Results:** Flavonoids reduced the expression of pro-inflammatory cytokines (IL-6, TNF $\alpha$ , visfatin) while increased the production of anti-inflammatory factors (IL-4, IL-10, Adiponectin).

**Discussion and conclusions:** Gliadin is a fraction of gluten, a protein present in cereals and represents the main antigen able to trigger an inflammatory reaction in intestine. Previous studies have shown that gliadin is able to induce a chronic inflammation in white adipose tissue, increasing the expression of proinflammatory cytokines; our study confirms this effect, indeed cells treated with gliadin showed an increase in expression of IL-6, TNF $\alpha$  and visfatin and a reduction of IL-4, IL-10 and adiponectin expression. After treatment with flavonoids, inflammatory reaction caused by gliadin was improved; indeed cells treated with gliadin and flavonoids showed an increase in expression of anti-inflammatory cytokines and a reduction in expression of proinflammatory adipokines. These preliminary data suggest that flavonoids present potential anti-inflammatory effects on white adipocytes and could be used to improve the inflammatory phenotype of adipose tissue.