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## **Gluten-free diet reduces adiposity, inflammation and insulin resistance associated with the induction of PPAR-alpha and PPAR-gamma expression.**

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### **Abstract**

Gluten exclusion (protein complex present in many cereals) has been proposed as an option for the prevention of diseases other than coeliac disease. However, the effects of gluten-free diets on obesity and its mechanisms of action have not been studied. Thus, our objective was to assess whether gluten exclusion can prevent adipose tissue expansion and its consequences. C57BL/6 mice were fed a high-fat diet containing 4.5% gluten (Control) or no gluten (GF). Body weight and adiposity gains, leukocyte rolling and adhesion, macrophage infiltration and cytokine production in adipose tissue were assessed. Blood lipid profiles, glycaemia, insulin resistance and adipokines were measured. Expression of the PPAR- $\alpha$  and  $\gamma$ , lipoprotein lipase (LPL), hormone sensitive lipase (HSL), carnitine palmitoyl acyltransferase-1 (CPT-1), insulin receptor, GLUT-4 and adipokines were assessed in epididymal fat. Gluten-free animals showed a reduction in body weight gain and adiposity, without changes in food intake or lipid excretion. These results were associated with up-regulation of PPAR- $\alpha$ , LPL, HSL and CPT-1, which are related to lipolysis and fatty acid oxidation. There was an improvement in glucose homeostasis and pro-inflammatory profile-related overexpression of PPAR- $\gamma$ . Moreover, intravital microscopy showed a lower number of adhered cells in the adipose tissue microvasculature. The overexpression of PPAR- $\gamma$  is related to the increase of adiponectin and GLUT-4. Our data support the beneficial effects of gluten-free diets in reducing adiposity gain, inflammation and insulin resistance. The data suggests that diet gluten exclusion should be tested as a new dietary approach to prevent the development of obesity and metabolic disorders.

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