Estrogen Receptor α Participates to the Beneficial Effect of Red Wine Polyphenols in a Mouse Model of Obesity-Related Disorders

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Résumé en anglais	Red wine polyphenol extracts (polyphenols) ameliorate cardiovascular and metabolic disorders associated with obesity. Previously, we demonstrated that the alpha isoform of estrogen receptor (ERα) triggers the vascular protection of polyphenols. Here, we investigated the contribution of ERα on the effects of polyphenols on cardiovascular and metabolic alterations associated with obesity. We used ovariectomized wild type or ERα-deficient mice receiving standard (SD) or western (WD) diets, or SD and WD containing polyphenols (SD+polyphenols and WD+polyphenols, respectively) over a 12-week period. Body weight was measured during treatment. Echocardiography examination was performed before sacrifice. Blood and tissues were sampled for biochemical and functional analysis with respect to nitric oxide (NO(•)) and oxidative stress. Vascular reactivity and liver mitochondrial complexes were analyzed. In WD-fed mice, polyphenols reduced adiposity, plasma triglycerides and oxidative stress in aorta, heart, adipose and liver tissues and enhanced NO(•) production in aorta and liver. ERα deletion prevented or reduced the beneficial effects of polyphenols, especially visceral adiposity, aortic and liver oxidative stresses and NO(•) bioavailability. ERα deletion, however, had no effect on polyphenol's ability to decrease the fat accumulation and oxidative stress of subcutaneous adipose tissue. Also, ERα deletion did not modify the decrease of ROS levels induced by polyphenols treatment in the visceral adipose tissue and heart from WD-fed mice. Dietary supplementation of polyphenols remarkably attenuates features of metabolic syndrome; these effects are partially mediated by ERα-dependent mechanisms. This study demonstrates the therapeutic potential of this extract in metabolic and cardiovascular alterations linked to excessive energy intake.
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