Red Wine Polyphenols Prevent Metabolic and Cardiovascular Alterations Associated with Obesity in Zucker Fatty Rats (Fa/Fa)

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**Résumé en anglais**
Background Obesity is associated with increased risks for development of cardiovascular diseases. Epidemiological studies report an inverse association between dietary flavonoid consumption and mortality from cardiovascular diseases. We studied the potential beneficial effects of dietary supplementation of red wine polyphenol extract, Provinols™, on obesity-associated alterations with respect to metabolic disturbances and cardiovascular functions in Zucker fatty (ZF) rats.

**Methodology/Principal Findings**
ZF rats or their lean littermates received normal diet or supplemented with Provinols™ for 8 weeks. Provinols™ improved glucose metabolism by reducing plasma glucose and fructosamine in ZF rats. Moreover, it reduced circulating triglycerides and total cholesterol as well as LDL-cholesterol in ZF rats. Echocardiography measurements demonstrated that Provinols™ improved cardiac performance as evidenced by an increase in left ventricular fractional shortening and cardiac output associated with decreased peripheral arterial resistances in ZF rats. Regarding vascular function, Provinols™ corrected endothelial dysfunction in aortas from ZF rats by improving endothelium-dependent relaxation in response to acetylcholine (Ach). Provinols™ enhanced NO bioavailability resulting from increased nitric oxide (NO) production through enhanced endothelial NO-synthase (eNOS) activity and reduced superoxide anion release via decreased expression of NADPH oxidase membrane sub-unit, Nox-1. In small mesenteric arteries, although Provinols™ did not affect the endothelium-dependent response to Ach; it enhanced the endothelial-derived hyperpolarizing factor component of the response. Conclusions/Significance Use of red wine polyphenols may be a potential mechanism for prevention of cardiovascular and metabolic alterations associated with obesity.

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