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Resveratrol induces browning program, up-regulate thermogenesis and mitochondrial function by interaction between metabolic organs in mice fed with high-calorie diet

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Resveratrol provides clear beneficial effects for the prevention of numerous diseases. However, many of the molecular events responsible for the curative and protective role of resveratrol remain elusive. The recent discovery of FNDC5/irisin protein that is liberated by muscle and adipose tissue might be an important finding with regard to this unsolved mechanism. The most striking aspect of this myokine is its alleged capacity to drive brown-fat development of white fat and thermogenesis. Moreover, resveratrol might induces activation of key molecules involved in the regulation of thermogenesis and brown fat cell differentiation. Thus, we study aimed evaluate the resveratrol effects about FNDC5/irisin expression in skeletal muscle and white adipose tissue in mice fed with high-fat diet. Our results showed that resveratrol induces significant ameliorate in metabolic profile like decrease in body weight, body fat, improve insulin-sensitivity and glucose tolerance as well as lower plasma levels of fasting glucose and lipids. These results followed by increase in levels of key molecules involved in the regulation of thermogenesis, brown fat cell differentiation and mitochondrial function like UCP1, PGC1α and SIRT1. In skeletal muscle, we observed increase in FNDC5/irisin expression only in mRNA levels. Nevertheless, not observed increase in FNDC5/irisin expression in white adipose tissue. More results indicated induction in browning of the white adipose tissue, despite that we found increase in UCP1, PRDM16, PGC1α and SIRT1 mRNA expression. In conclusion, our findings provide evidence that resveratrol increases levels expression the important genes involved in thermogenesis activation, but independent of the FNDC5/irisin activation. Finally, the present findings suggest new mechanism of action of the resveratrol.

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