



The Effects of High Fat Diet and Resveratrol on Mitochondrial Activity of Brown Adipocytes (*Endocrinol Metab* 2016;31:328-35, Cheol Ryong Ku et al.)

Ji-Young Cha

Department of Biochemistry, Lee Gil Ya Cancer and Diabetes Institute, Gachon University College of Medicine and Gachon Medical Research Institute, Gachon University Gil Medical Center, Incheon, Korea

Resveratrol (RSV) is a naturally occurring polyphenol that has been shown to have a wide range of biological activities, including phytoestrogenic, antioxidant, anti-inflammatory, anti-cancer, and anti-aging functions [1-3]. Several studies have proposed that RSV has beneficial effects on obesity and diabetes, such as decreased adipogenesis and viability in maturing preadipocytes, and increased lipolysis and decreased lipogenesis in mature adipocytes [2,4]. Treatment with RSV in mice ameliorated insulin resistance and increased resistance to cold [4]. The beneficial effects of RSV have been largely attributed to the ability of RSV to enhance energy expenditure by boosting mitochondrial function as a result of increased levels of peroxisome proliferator-activated receptor γ coactivator 1 α (PGC-1 α) and uncoupling protein 1 (UCP-1) in skeletal muscles and brown adipose tissue (BAT) [4].

Recently, Ku et al. [5] demonstrated that RSV treatment improved insulin sensitivity in Otsuka Long Evans Tokushima Fatty (OLETF) rats which were fed either a standard chow diet (SD) or high fat diet (HFD). RSV treatment increased the number of brown adipocytes in both diet groups. However, the increased mitochondrial activity related to increased expression of UCP-1, phospho-adenosine monophosphate-activated protein kinase (phospho-AMPK), and estrogen receptor α (ER- α) was

observed only in HFD-fed OLETF rats. These effects are consistent with the previous report from Lagouge et al. [4] which showed that RSV activates APMK and surtuin 1 in HFD-fed mice leading to activation of PGC-1 α , and increased mitochondrial biogenesis. However, future studies are needed to address the mechanism of RSV on the mitochondrial activation of BAT and improved insulin sensitivity in SD-fed OLETF rats.

An interesting finding from this study was that RSV increases the expression of ER- α in the HFD group. RSV has been shown to act as a phytoestrogen and interact directly with ER- α and ER- β [6,7]. The phytoestrogenic action of RSV might depend on the distinctive expression patterns of ER- α and ER- β and the amplitude of this effect is also cell type specific. Therefore, more detailed investigations on the relationship between mitochondrial activity and ER- α would help elucidate the mechanisms underlying the beneficial effects of RSV on insulin sensitivity.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

Corresponding author: Ji-Young Cha

Department of Biochemistry, Lee Gil Ya Cancer and Diabetes Institute, Gachon University College of Medicine, 155 Gaetbeol-ro, Yeonsu-gu, Incheon 21999, Korea

Tel: +82-32-899-6070, **Fax:** +82-32-899-6032, **E-mail:** jycha1014@gachon.ac.kr

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ORCID

Ji-Young Cha <http://orcid.org/0000-0002-8557-6214>

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