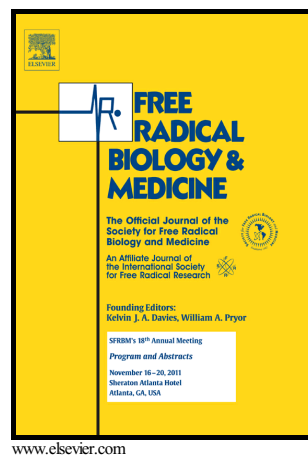


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A fish oil diet induces mitochondrial uncoupling and mitochondrial unfolded protein response in epididymal white adipose tissue of mice.

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Abstract

White adipose tissue (WAT) mitochondrial dysfunction is linked to the pathogenesis of obesity driven insulin resistance. Dietary conditions that alter fat mass are known to affect white adipocyte mitochondrial function, however, the impact of high calorie diets on white adipocyte mitochondria is not fully understood. The aim of this study is to assess the effect of a diet rich in saturated or polyunsaturated fat on mitochondrial unfolded protein response (UPR^{mt}), a retrograde signaling response that maintains mitochondrial homeostasis, in epididymal WAT (eWAT). Mice were fed a low fat diet (LFD), saturated fat diet (SFD) or fish oil (unsaturated fat diet, UFD) and assessed changes in eWAT mitochondria. Compared to mice fed a LFD, SFD-fed mice have reduced mitochondrial biogenesis markers, mitochondrial fatty acid oxidation enzymes and TCA cycle enzymes, suggesting an impaired mitochondrial function that could contribute to increased fat mass. In contrast, isocaloric UFD-fed mice have increased expression of mitochondrial uncoupling protein 1 (UCP1) and peroxisomal fatty acid oxidation enzymes suggesting that elevated mitochondrial uncoupling and peroxisomal fatty acid oxidation could contribute to the reduction in fat mass. Interestingly, expression of UPR^{mt}-associated proteins caseinolytic peptidase (ClpP) and heat shock protein 60 (Hsp60) are induced by UFD, whereas SFD reduced the expression of ClpP. Based on our data, we propose that induction of UPR^{mt}

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