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Context-Dependent Modulation of Early Visual Cortical Responses to Numerical and Nonnumerical Magnitudes

by Joshua P. Nederveen, Katherine Manta, Adam L. Bujak, Alexander C. Simone, Matthew R. Fuda, Mats I. Nilsson, Bart P. Hettinga, Meghan C. Hughes, Christopher G. R. Perry and Mark A. Tarnopolsky

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ABSTRACT

We investigated the effects of a novel multi-ingredient supplement comprised of polyphenol antioxidants and compounds known to facilitate mitochondrial function and metabolic enhancement (ME) in a mouse model of obesity. In this study, 6-week-old male C57/BL6J mice were placed on a high-fat diet (HFD; ~60% fat) for 6 weeks, with subsequent allocation into experimentalgroups for 4 weeks: HFD control, HFD + ME10 (10 components), HFD + ME7 (7 components), HFD + ME10 + EX, HFD + EX (where '+EX' animals exercised 3 days/week), and chow-fed control. After the intervention, HFD control animals had significantly greater body weight and fat mass. Despite the continuation of HFD, animals supplemented with multi-ingredient ME or who performed exercise training showed an attenuation of fat mass and preservation of lean body mass, which was further enhanced when combined (ME+EX).

ME supplementation stimulated the upregulation of white and brown adipose tissue mRNA transcripts associated with mitochondrial biogenesis, browning, fatty acid transport, and fat metabolism. In WAT depots, this was mirrored by mitochondrial oxidative phosphorylation (OXPHOS) protein expression, and increased in vivo fat oxidation measured via CLAMS. ME supplementation also decreased systemic and local inflammation markers. Herein, we demonstrated that novel multi-ingredient nutritional supplements induced significant fat loss independent of physical activity while preserving muscle mass in obese mice. Mechanistically, these MEs appear to act by inducing a browning program in white adipose tissue and decreasing other pathophysiological impairments associated with obesity, including mitochondrial respiration alterations induced by HFD.

KEYWORDS

mitochondria, obesity, multi-ingredient supplement, browning, high-fat diet, antioxidant

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