

Trans-anethole Ameliorates Obesity via Induction of Browning in Diet-induced Obese Mice

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Objectives: Pharmacological induction of brown adipocyte-like phenotype in white adipocytes (browning) is considered a novel strategy against obesity due to their ability to increase energy expenditure. We found that trans-anethole (TA), a flavoring substance present in the essential oils of plants, possesses the capacity to recruit browned adipocytes both in 3T3-L1 adipocytes and in obese mice fed a high fat diet.

Materials and Methods: Induction of browning by TA was investigated by determining the expression levels of core brown adipocyte-specific genes and proteins by real-time RT-PCR, immunoblot analysis in both 3T3-L1 adipocytes and white adipose tissue (WAT) of diet-induced obese mice.

Results: Oral administration of TA (100 mg/kg) markedly reduced body weight gain (27.3 % reduction for 8 week treatment) in C57BL/6 obese mice fed a high fat diet. TA significantly increased expression of BAT signature proteins in a dose-dependent manner as well as their corresponding genes and beige-specific genes in 3T3-L1 adipocytes. Likewise, TA ameliorated the diet-induced obesity by elevating the expression of proteins involved in thermogenesis in diet-induced obese mice. TA also plays a role in enhancement of lipolysis and lipid catabolism. Moreover, TA increased mitochondrial biogenesis as determined by elevated expression of genes responsible for mitochondrial biogenesis as well as direct observation by transmission electron microscope in WAT.

Conclusion: our findings suggest that TA plays a dual modulatory role in induction of the browning as well as promotion of lipid metabolism in white adipocytes and thus may have potential therapeutic implications for treatment of obesity.