

Obese Women with Reduced Thermogenic Response to Caffeine Have Difficulties in Losing Body Weight

N. SAKANE, T. YOSHIDA, T. UMEKAWA, M. KONDO

First Department of Internal Medicine,
Kyoto Prefectural University of Medicine, Kyoto 662, Japan

ABSTRACT

Reduced function of brown adipose tissue (BAT), which is a main effector organ of diet-induced thermogenesis as well as of non-shivering thermogenesis, is regarded with keen interest as a cause of obesity in various experimentally obese animals. However, it is unclear whether there is obesity due to reduced thermogenesis in humans because we cannot measure BAT function directly in humans. To clarify this point, we examined 136 obese women (mean age: 42.6 ± 1.4 years; mean duration of obesity: 4.6 ± 1.7 years; mean body weight: 73.2 ± 3.8 kg; mean BMI: 30.9 ± 1.5 kg/m²) by measuring the resting metabolic rate (RMR) before and 30 min after a caffeine [which activates BAT function and RMR in mice] overloading test at a dosage of 4 mg/kg. The women were divided into a group with normal thermogenesis (106 patients, 77.9%) and a group with reduced thermogenesis (36 patients, 22.1%). Two months after a diet and exercise therapy, body weight, BMI and fat percentage were significantly reduced in the group with the normal thermogenesis, but almost unchanged in the group with the reduced thermogenesis. The thermogenic response to caffeine was markedly correlated with loss of body weight ($r = 0.6943$, $P < 0.001$). These results suggest that there may be obesity due to reduced thermogenesis even in humans, and it should therefore be treatable with drugs (e.g. β -3 adrenoceptor agonist) which activate thermogenesis, in addition to a diet and exercise therapy.