Seasonal effect on Diet-Induced Thermogenesis

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Abstract

Information about seasonality in the measurement of diet-induced thermogenesis (DIT) is important for understanding the intra-individual variability of DIT and the contribution of DIT on weight regulation. In this study, the seasonal change of DIT in autumn and winter were investigated for young women (N = 14, 18 – 24 yrs). The DITs of subjects were measured in autumn and winter. The DIT, body weight, body mass index (BMI) and percent body fat of each subject were measured on four or more occasions in each season for precision, and the mean value was used as the individual's value for a given season. The mean outdoor temperatures at starting measurement in the morning were 22°C in autumn, and 11°C in winter. The means of body weight, BMI and percent body fat did not change between seasons. DIT (%) significantly declined from autumn to winter (p < 0.05, Paired t-test). For DIT curve (the increase of postprandial energy expenditure during 300 min after meal), significant main effect of season was observed (ANOVA, p < 0.05, autumn > winter).

In conclusion, there is the seasonal effect on DIT measurement; it declines from autumn to winter. The seasonality would be needed to be considered in any future study of DIT.

Key words: Diet-Induced thermogenesis, seasonality, young women

1. Introduction

There has been a lot of interest in excessive energy intake and the decline in physical activity as major causes for human obesity. In addition to those causes, the possibility has recently been pointed out that a decline in thermogenesis function is also a possible cause of obesity. Regarding thermogenesis, studies have been done on obesity such as basal metabolic rate, resting metabolic rate and Diet-Induced Thermogenesis (DIT), which is defined as "the increase of energy expenditure induced by meal ingestion" (Segal, 1989; Tounian, 1993). The DIT focused on in this very study accounts for a minor portion of total energy expenditure in a day, however, its decline is considered to be related to the decline of the energy expenditure that could cause obesity in the long term. There is a recent report indicating that a habitual dieting has a direct effect on DIT (Tobe, 2003).

The relation between body weight change and DIT has been investigated in order to clarify the role of DIT for body weight regulation, however, no consistent result has been observed. Research on the relationship between body weight change of obese people and DIT has shown that DIT increases as body weight decreases (Maffeis et al., 1992), and also that the DIT decreases (Garrow and Webster, 1989; Nichols et al., 1989). Weststrate (1993) points out that there exists a great intra-individual variability in measurement of DIT and it is a major research result discrepancies. Weststrate also states that a research design with a greater power of test is necessary. It is similarly necessary to specify the cause of an intra-individual DIT variation in order to further understand DIT and to aid in the further study of DIT.

Seasonal effects on DIT measurement have not yet been focused upon. The purpose of this study is to clarify the possibilities of any seasonal effects on

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