

Plenary 5: Body Weight Regulation

Dietary protein and energy expenditure: implications for the maintenance of a stable body weight

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Worldwide the incidence of obesity has more than doubled over the last 20 years. Over 50 % of Australian women and men are now classified as overweight and ~20 % are obese (1). In simplest terms, obesity is caused by excessive energy intake coupled with insufficient energy expenditure. One major challenge of health professionals in the field of obesity-related disease is to develop dietary regimes that sustain both: i. the sensation of fullness/satiety and thereby reduce food intake and, ii. energy expenditure. Since the 1960s, various fad diets have claimed that hypo-caloric, low carbohydrate diets containing a high amount of protein can facilitate weight loss by decreasing hunger and blunting the fall in total (TEE) and resting energy expenditure (REE) that frequently occurs during energy restriction and weight loss. Very few investigators however have measured TEE as well as, one or more of its components, when examining the effects of high-protein diets on energy expenditure and weight loss. Therefore, whether the claimed advantages of dietary protein on energy expenditure play a significant role in body weight loss or maintenance, remains unclear.

In the confines of a whole body respiration chamber, several investigators measured the multiple components of TEE in response to isocaloric, high-protein as compared to standard-protein diet consumed for between 36 hours to 7-days (2-4). All showed TEE and sleeping metabolic rate increased following the high- as compared to standard protein diet. In addition, Lejeune et al. and Mikkelsen et al. reported a greater thermogenesis (TEF). Each of these studies fed subjects at a level to maintain energy balance and significant weight loss was not observed. Therefore, relationships between changes in energy expenditure and body weight could not be determined. In contrast, our group conducted three studies comparing the effects of two isocaloric, energy restricted diets that contained either a high or standard amount of protein (30 vs 15% of energy as protein), in subjects with Type 2 diabetes (n = 26)⁽⁵⁾ and hyperinsulinemic (n = 36)^(6,7). Each study consisted of 8 to 12 weeks moderate energy restriction (~ 30% reduction in daily energy requirements) followed by 4 weeks of energy balance to achieve weight stabilization. Weight loss, REE and TEF were measured at the end of the of energy balance period after a period of weight stabilisation. In each study, we observed that the reduction in body weight (5-10%) resulted in a concurrent 4-9% fall in absolute REE (i.e. equates to ~ 77-172 kcal/d). Dietary protein content had no impact on the observed reduction in weight or REE. The TEF however was consistently greater in the high- as compared to standard-protein diet group (> by 1.7, 0.8, and 2.6 %, respectively (5-7). Although the greater TEF of the high-protein diet was not associated with weight loss in any of our studies, we do speculate that it may help some individuals successfully maintain their weight loss provided they maintain energy balance (i.e. a difference of 0.8 to 2.6% in TEF may equate to a difference in weight regain of up to 2 kg).

References

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