Whey-reduced weight gain is associated with a temporary growth reduction in young mice fed a high-fat diet

Whey-reduced weight gain is associated with a temporary growth reduction in young mice fed a high-fat diet. Whey protein consumption reportedly alleviates parameters of the metabolic syndrome. Here, we investigated the effects of whey protein isolate (whey) in young mice fed a high-fat diet. We hypothesized that whey as the sole protein source reduced early weight gain associated with retarded growth and decreased concentration of insulin-like growth factor-1. Moreover, we hypothesized that these changes were explained by increased nitrogen loss via elevated urea production and/or increased energy expenditure. Male 5-week-old C57BL/6 mice were fed high-fat diets with the protein source being either whey, casein or a combination of both for 5 weeks. After 1, 3 or 5 weeks, respectively, the mice were subjected to a meal challenge with measurements of blood and urinary urea before and 1 and 3 h after eating a weighed meal of their respective diets. In a subset of mice, energy expenditure was measured by indirect calorimetry during the first week of dietary intervention. Observed exclusively during the first week of intervention, whey significantly reduced body length (P < 0.01) and weight gain (P < 0.001) correlating positively with plasma concentrations of insulin-like growth factor-1. The combination diet displayed intermediate results indicating an interactive effect. Urea production, urea cycle activity, food intake and energy expenditure were unaffected by protein source. In conclusion, whey decreased growth-related parameters exclusively during the first week of dietary intervention. The early effect of whey could not be explained by food intake, energy expenditure, urea production or urea cycle activity but was correlated with plasma levels of insulin-like growth factor-1.

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