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Metabolic effects of overfeeding and the role of protein in protection of weight gain

Statement of the Problem: Obesity has become a major Public health concern with more than 60% of adults in the United States categorized as overweight and obese. As obesity develops, a number of metabolic changes occur. These changes may reflect differences in the way individuals handle the food they eat each day both during weight gain and weight loss. Overeating a diet low or high in dietary protein may maintain body weight through metabolic inefficiency because of the energy cost involved in sparing lean body mass with a low protein diet but expanding lean body mass with a high protein diet. The purpose of this study was to determine whether the level of dietary protein differentially affected body composition, weight gain, or energy expenditure under tightly controlled conditions in a randomized controlled trial.

Methodology: Participants were randomized to diets containing 5%En (low), 15% (normal), or 25% (high) from protein, which they were overfed during 8 weeks. The intervention diets provided approximately 40% more energy intake. Body composition was measured by DEXA, resting energy expenditure was measured by ventilated hood, and total energy expenditure by doubly labeled water prior to the overeating and at week 8.

Findings: Overeating produced significantly less weight gain in the low protein compared with the normal protein group or the high protein group ($P=.002$). Body fat increased similarly in all 3 groups and represented 50% to more than 90% of the excess stored calories. Resting energy expenditure, total energy expenditure, and body protein did not increase during overfeeding with the low protein diet. In contrast, resting energy expenditure and body protein increased significantly with the normal and high protein diets.

Conclusions: Among persons living in a controlled setting, calories alone account for the increase in fat; protein affected energy expenditure and storage of lean body mass, but not body fat storage

Biography

Dr. Lilian de Jonge obtained her PhD in nutrition from the Université de Montréal. After her PhD degree, she moved to the Pennington Biomedical Research Center in Baton Rouge, LA where she was a faculty member and the director of the Metabolic Assessment Core, a position she held until 2010. She studied the adaptation of energy expenditure and substrate oxidation to changes in dietary composition and energy balance. Dr. de Jonge has collaborated with a large number of investigators on studies, both federally and privately funded. She is now a faculty member at George Mason University in Fairfax VA.

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