

**GEORGE MASON UNIVERSITY
COLLEGE OF SCIENCE
DEPARTMENT OF BIOLOGY SEMINAR
Fall 2016**

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“Metabolic Adaptation: Beyond Energy Balance”

About 66% of the adults in the United States are overweight or obese. Multiple factors are likely to be involved in the development of this epidemic, including increased dietary fat and decreased levels of physical activity since obesity is the result of a long term condition of positive energy balance with energy intake on the input end of the equation and energy expenditure is on the output side. Total Daily Energy Expenditure exists of three components, Resting Energy Expenditure (REE), being responsible for 60-70%, the Thermic Effect of Food (TEF) which takes up about 10%, and Physical Activity related energy expenditure, which varies largely from day to day. A low REE has been shown to be a predictor of weight gain over time. It is well known that weight loss results in a decrease of REE, due in part to a decrease in lean body mass, the strongest predictor of REE, but also due to a metabolic adaptation to the caloric restriction, leading to a higher energy efficiency. In addition to energy expenditure, substrate oxidation and especially the ratio of fat to carbohydrate oxidation have gained interest over the past few decades. Respiratory Quotient, the ratio of CO₂ production over oxygen consumption, is an index of substrate oxidation where higher values herald preference for carbohydrate vs. fat oxidation, and high RQ strongly predicts fat accumulation over time. Metabolic adaptation as a consequence to a change in either energy balance or macronutrient balance occurs in all individuals. However, the rate of and level of adaptation varies largely between those individuals due to factors that are not just related to energy balance per se but also to genetic, physiological, behavioral and environmental factors, to name a few.

**TUESDAY September 20, 2016
3:00-4:15 PM
Innovation Hall Room 131**