

Energy Needs For Positive People

by Sharon Ann Meyer, AS, AA, DTR

An HIV-positive individual's ability to track body weight status and meet nutrient needs deserves early attention. It is imperative to understand the importance of consuming an adequate amount of calories to assist in maintaining a healthy weight. Appropriate caloric intake can assist to limit secondary complications and decrease the incidence of malnutrition and obesity. Helping HIV-positive people to secure the knowledge they need to maintain a healthy weight is beneficial to the individual as well as to the health care system. Even a basic understanding of nutrients can assist in improving dietary adequacy.

Few people with HIV are aware of their individual nutrient needs, which greatly impairs their ability to meet them. Inadequate caloric intake is evident in a majority of HIV-positive people as demonstrated by weight loss, which plays a role in decreasing nutritional status and quality of life. Weight loss and wasting continue to be an issue for HIV-positive people despite control of HIV viral load and the use of highly active antiretroviral therapy (HAART).^{1, 2} Longitudinal data analysis of 38 patients from the Nutrition for Healthy Living Study at Tuft's University however, reveals that patients on HAART with decreased viral loads can have significantly greater weight gain (mainly in fat mass) per month than non-responders.³ In another small study, patients on HAART gained weight, body mass index, and fat-free mass; only those with AIDS gained fat mass.⁴

ENERGY EXPENDITURE

Determination of adequate daily needed calorie intake necessitates review and understanding of the various factors that affect the real determinant of energy balance, total energy expenditure (TEE). Caloric requirements are based on several components of TEE (Table 1).⁵ These components include resting metabolic rate (RMR), thermal effect of exercise, thermal effect of food (obligatory expenditure associated with nutrient assimilation), and facultative thermogenesis.⁶⁻⁹ Thermal effect of exercise is the second largest component of energy expenditure and includes physical activity above basal levels.⁷ Facultative thermogenesis appears to account for up to 15% of TEE. It's the difference in energy induced by changes in surrounding temperature, food intake, emotional stress, and other factors.

Factor	Effect	% of Change
Nutritional status	Starvation: Decrease	Up to 50%
Thyroid function	Increase or decrease	40- 100%
Genetics	Varies per kg of fat free mass	~ 11%
Gender	Decrease in females	~ 10% lower
Fever	Increase (per degree >98.6°F)	7%
Body size	Increase (with > wt./muscle)	~ 6%
Age	Decrease (per decade)	~ 2-3%
Sympathetic nervous system	Stress: Increase	Varies
Diet	Increased Protein: Increase	Varies
Menstrual cycle	Varies per cycle	Varies
Pregnancy	Increase	Varies

Lactation	Increase	Varies
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TABLE 1. COMPONENTS OF ENERGY EXPENDITURE

RMR usually accounts for 50-75% of TEE.^{7, 10} This measurement includes energy expended for normal body functions, homeostasis, and activation of the sympathetic nervous system. Basal metabolic rate (BMR), the total energy output of a person at rest after a 12-18 hour fast, declines from a maximum in infancy.^{7, 11} Differences in energy expenditure among smokers and men consuming a low zinc diet are documented in the scientific literature.^{12, 13} Although smokers can have increased energy needs, people on low zinc diets may decrease their energy expenditure. BMR may be slightly lower than RMR but they are often used interchangeably.

The amount of energy required to meet the RMR/BMR is known as the resting energy requirement (REE). REE is either consistently or inconsistently elevated, or decreased in patients living with HIV.¹⁴⁻¹⁷ HAART may increase metabolic demands elevating REE despite control of viral replication.¹ REE per kilogram of lean body mass was significantly higher in a small cross-sectional study of lipodystrophy patients with insulin sensitivity being an independent predictor of REE.¹⁸ Elevated REE may also decrease in patients with HIV or AIDS during PI therapy.⁴ Batterham and colleagues recently found that in HIV-positive males, REE is significantly higher than that of healthy controls.¹⁹ Other factors known to influence REE are nutritional status, tumor necrosis factor-alpha,²⁰ thyroid function, and activity in the sympathetic nervous system⁵. As with BMR and RMR the terms basal energy expenditure (BEE) and REE are used interchangeably because they vary by less than 5%.

PREDICTING NEEDS

Human energy requirements are predicted with the use of a variety of tools. Prediction equations like Harris-Benedict (HBE) are the result of indirect calorimetry measurements. Researchers have found significant differences resulting from the use of these equations to calculate energy needs. Results comparing calculated energy need using the HBE to measured energy consumption by indirect calorimetry suggest that calculating energy expenditure by using a formula like HBE consistently underestimates actual REE in HIV-positive people.²¹ Mulligan and others found that REE ranged from 88-136 % of the value calculated by the HBE.²² People with the highest viral loads had the highest REE. HIV-related body composition abnormalities render the use of standard prediction equations for estimating REE invalid.¹⁹ In Batterham's study, REE adjusted for fat-free and fat mass was significantly greater in weight-stable and lipodystrophy patients with HIV compared with healthy controls.

CALCULATION VERSUS ESTIMATION

Although general caloric intake recommendations are common, we know that specific calculations are necessary to determine individual energy needs. The nutrition assessment is crucial in setting realistic goals to help people with HIV reach optimal weight and nutritional status. It is one of the most helpful services that we can offer at any stage of HIV disease. The nutritional assessment should include an accurate calculation of energy needs and a thorough assessment of factors that may detrimentally affect nutritional intake.

The clinician's determination of a sufficient calorie level is of the utmost importance for optimum nutritional health. In America, the HBE, which incorporates gender, weight, height, and age as primary variables, is the most commonly used tool to calculate BEE.²³ Additional activity and stress factors are applied to the HBE to better determine individual caloric requirements. An

accurate determination of body weight and body height results in a more accurate individual BMR prediction. Bower's group found that the HBE underestimates the energy needs of adults living with HIV by approximately 13% so clinicians should consider adding a 1.13 stress factor when using the HBE to estimate energy requirements in HIV-positive individuals.²⁴ Once the BEE is determined, the addition of appropriate injury and weight gain factors contributes to a caloric level that helps the patient to reach and maintain desired body weight.

ESTIMATING ENERGY NEEDS

Those without access to a nutrition professional may still be able to help HIV-positive people maintain a healthy weight by estimating caloric needs. General recommendations to assist HIV-challenged individuals in maintaining body weight are between 25- 50 calories per kilogram of actual body weight.⁵ In Chlebowski and others study, daily energy intake was calculated to be sufficient for weight maintenance based on 30 calories per kilogram of usual or desirable body weight.²⁵

Up to 60 calories per kilogram of actual body weight may be needed depending on a variety of factors including secondary infections.²⁶ A minimum daily intake of 16 calories for each pound of baseline weight before infection or wasting for men and between 13-14 calories for each pound of body weight for women is a reasonable starting point.²⁷ Obviously, if initial estimated energy needs are insufficient to reach and maintain a healthy weight they need to be adjusted.

Clinicians can help positive people to meet their nutrient needs by offering educational tools needed to avoid unnecessary weight loss or obesity. A well-educated person has a much better chance of meeting nutrient needs with the consumption of a diet that fulfills total energy requirements. Armed with adequate and appropriate knowledge of their nutritional needs HIV-positive individuals are more able to participate in and improve their health care and quality of life.

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