

individuals and defy reasonable adjustment, and BMI use in this population becomes highly questionable.

The “central versus total fat” controversies do not seem firmly based, as BMI is not a trustworthy measure of total body fat, and there is only limited evidence that WC represents some vaguely defined central “fat compartment.” WC is probably less perturbed by aging changes, although vertebral compressions can shorten the trunk and “falsely” increase waist measurement. Hip circumference is affected somewhat by fatness but probably best correlates with the size of the frame/LBM. Height also correlates with LBM, with the noted $\pm 20\%$ range of LBM at a given height. Thus, the ratios of WHR and WHtR probably serve as approximate adjustments of WC to individual size. WHtR, an admittedly coarse measurement, is probably the best available approximation of overall “fatness,” WF/body weight, for large groups and over broad ranges of age, and was statistically the best model fit (1).

In large populations, almost any reasonable tool, even “eyeballing,” should provide some approximation of fatness and correlate with fat-related conditions. Behnke (5), who pioneered human densitometry, later accommodated to a tape measure and simple procedures for the practical estimation of body fatness. Until improved methods are available, we can best understand relationships of body composition and future morbidity by appreciating the limitations of current anthropometric tools.

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Reply

The assessment of clinical usefulness for any measure, and perhaps particularly for measures of adiposity, relies largely on preference when the measures are statistically similar in their associations with relevant outcomes. While it is true that our study’s results (1) are based on analyses of large cohorts, we do not agree that they are limited in their application to individuals, as suggested by Dr. Green. In our study, we found that measures of obesity other than body mass index (BMI) do not substantially improve statistical prediction of cardiovascular outcomes. At the same time, we acknowledged the limitations of BMI, both in misclassifying the muscular lean and in its deficiency in describing the distribution of body fat.

The question then shifts to which measure should be employed clinically. Conveying the risks of obesity to patients in daily clinical practice requires, in part, a measure substantiated in standard definitions of overweight and obese. While, for a given individual, changes in BMI over time will rely on changes in body weight, the meaning of these changes in weight is often interpreted as progress toward a healthier goal based on BMI. We do not yet understand fully how best to target modifications of the waist circumference or waist-height-ratio, since body fat distribution appears less malleable to change than overall weight. Further study on approaches to and benefits of altering body composition and waist circumference may clarify these issues.

In our study, we do not advocate a single measure be strictly employed in clinical practice. Certainly, for some patients, following changes in various anthropometric measures may prove clinically useful in encouraging healthy weight goals. Many patients, however, will strive for better health through weight reduction. For these individuals, success is defined by a lower BMI, and not by other measures.

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Reply

Drs. Green and Lesser each raise several legitimate and thought-provoking issues regarding the article by Gelber et al. (1) and my accompanying editorial (2). Their letters highlight several of the more important challenges that we face in confronting the obesity epidemic—first and foremost among these is the very problem of defining obesity. I concur that there is no single measure of adiposity that is simple to obtain, highly reproducible, widely available, and fully reflective of cardiovascular (or other) risk. Given this problem, I tried to make a case in the editorial that for a majority of the population, particularly those in the age range where interventions intended to induce loss of fat are most likely to be beneficial (younger and middle-age patients), body mass index (BMI) performs nearly as well as waist circumference (or waist/hip or waist/height). Therefore, until we find a better measure of fatness, I opined that we should continue to use BMI. All that being said, I readily agree that BMI has significant limitations as a means to define and quantify obesity.

Dr. Green correctly points out the irresolvable problem of relating population statistics to the care of individual patients. While I agree fully with this point, I believe that the dilemma is