

## Weight of the nation: moving forward, reversing the trend using medical care<sup>1–4</sup>

George L Blackburn

Even as the growth rate of obesity levels off in some US groups (1), the condition continues to impose ever-higher health care and economic costs on America. Obesity affects more than one-third of adults (35.7%) and ~17% of children and adolescents. Forecasts based on a linear time trend suggest that by 2030, 51% of the population will be obese (2).

Those numbers may well represent a generation whose life expectancy is likely to be shorter than that of their parents (3). They may also be the harbinger of more than a doubling in the rates of severely obese individuals—those with a BMI (in kg/m<sup>2</sup>) ≥40 who are ~100 pounds (lb) overweight—from <5% in 2010 to 11% in 2030 (2). That figure, up from 1% at the start of NHANES in 1960 (4), includes people with class III obesity who will require medical care.

In 2008, the cost of obesity hit a high of \$147 billion, or ~9% of annual health care expenses. A one-percentage-point cut from the projected trend of obesity over the next 2 decades will save America an estimated \$85 billion. If prevalence were to remain at 2010 levels, the combined obesity-attributable savings in medical expenditures over the next 2 decades would be ~\$550 billion (2).

The most cost-effective way to intervene is through nutritional changes that produce durable weight loss via realistic and sustainable goals, ie, those that improve or reverse obesity-related chronic diseases. On the basis of prior data, a reasonable target is 10% of baseline weight per person (4). This can be achieved through medical treatment of severe obesity (5).

Severe obesity will require the following intensive efforts: 15% weight loss to restore  $\beta$  cell function (6), medical care to ensure overall health (7), very-low-calorie diets (VLCDs) supervised by health care professionals (8, 9), and intensive behavior therapy (8, 10). It will also require far greater public health efforts to treat obesity and to prevent its development (11, 12).

In this issue of the *Journal*, Hemmingsson et al (13) report on a 1-y commercial weight-loss program among self-selected, self-paying adults in Sweden. The study's aim was to quantify weight-loss and dropout rates by using 3 diets: 1) a restricted normal-food diet (1500–1800 kcal/d), followed by a diet and maintenance program; 2) a formula and food combination low-calorie diet (1200–1500 kcal/d); and 3) a liquid formula VLCD (500 kcal/d). A total of 9037 individuals participated in the program at baseline.

Those in the VLCD group lost the most weight (11.4 kg or 25 lb), mainly in the first 3 mo and improved their  $\beta$  cell function (6).

A higher proportion of these individuals lost ≥15% of body weight, and their dropout rate of 18% was significantly lower than that in the other diet groups. However, the dietary compliance rate even in the VLCD group was <50% (assuming the cohort was, on average, 75 lb overweight and 67 inches tall and had a body weight of 215 lb).

The main trial effect was a linear, dose-response relation between energy intake and lower body weight. BMI, percentage weight loss, and waist circumference were also reduced in a dose-response fashion according to kilocalorie intake. Differences in effectiveness between weight-loss methods were similar when Hemmingsson et al (13) analyzed waist circumference and percentage body weight as outcome variables, suggesting that the greater the negative energy balance, the greater the weight loss.

These findings are akin to those from Palgi et al (9). They enrolled 668 obese individuals in a multidisciplinary treatment program that included nutrition education, behavior modification, exercise, and a VLCD. The mean ( $\pm$ SD) age of participants was 38  $\pm$  11 y, with an average BMI of 36  $\pm$  17 and a mean change in body weight of 40 lb (excess body weight loss of 56  $\pm$  26%). This weight loss was associated with improvements in vital signs, serum lipids, and fasting blood sugar.

Palgi et al (9) noted that for most patients with moderate or more severe obesity ( $\geq$ 130% of ideal body weight), VLCDs provide a safe opportunity to lose a large fraction of their excess weight. However, this success can hardly be considered a cure; most patients eventually gain back much or all of the weight lost (14).

Treatment goals for obesity are substantial weight loss maintained over a prolonged period, thus reducing the likelihood of relapse, weight cycling, and the development of obesity-related diseases. However, only a minority of patients maintain long-

---

<sup>1</sup> From Beth Israel Deaconess Medical Center, Department of Surgery, Center for the Study of Nutrition Medicine, Boston, MA.

<sup>2</sup> The proceedings of the Weight of the Nation conference can be found at <http://www.cdc.gov/features/weightofthenation/>.

<sup>3</sup> GLB is supported in part by NIH/NIDDK grant DK05715.

<sup>4</sup> Address correspondence to GL Blackburn, Beth Israel Deaconess Medical Center, Department of Surgery, Center for the Study of Nutrition Medicine, Feldberg 880, East Campus, 330 Brookline Avenue, Boston, MA 02155. E-mail: gblackbu@bidmc.harvard.edu.

First published online October 3, 2012; doi: 10.3945/ajcn.112.049643.

term weight loss of 15%, even with the use of low-calorie diets and intensive behavior therapy (10).

This need not be a reason for treatment nihilism (10). Many obesity-related illnesses—including asthma, diabetes, dyslipidemia, hypertension, and sleep apnea—improve or resolve after moderate excess weight loss. Moreover, new technologies are opening many doors to success that did not exist even 5 y ago. Leveraging these assets may tip the scale in favor of therapeutic interventions.

Smart phones, tablets, and hundreds of weight-loss applications are available for downloading to electronic devices. These tools can be instantly accessed, making it easier and more convenient for overweight and obese individuals to monitor their real-time food intake, physical activity, and weight—behaviors that are critical for short- and long-term weight control.

At the same time, investigators are examining new modalities—such as behavioral economic-based interventions (15), texting (16), coaching (17), and Wi-Fi scales that automatically transmit data to a server—to deliver intensive lifestyle management programs that promote durable weight loss. The explosion in electronic communications (the Internet, e-mail, Facebook, Twitter, and other social media) (18) makes it possible to interact with and/or coach patients more frequently, faster, and at lower costs than ever before.

Overweight and obese individuals will increasingly be able to participate in distance-based weight-loss programs, whether delivered by call centers or via the Internet, text messages, or social networking sites. Technological advances will equip clinicians to reach millions of individuals with effective lifestyle modification programs (18).

Perhaps most promising is the potential of mobile technologies to deliver multiple risk factor interventions more intensively at less cost. The use of this approach for the self-monitoring and feedback components of interventions can limit the need for human intervention to a few remote coaching sessions that could be delivered via Web or mobile computer applications (17).

Hemmingsson et al (13) and others have shown that intensive lifestyle interventions and VLCDs can produce success, albeit often short-lived. In the months and years to come, mobile technology will enable flexible, automated, and intensive medical treatment of severe obesity to be delivered exactly when, where, and how it's needed to achieve and maintain clinical objectives.

GLB is a member of the Vivus speaker faculty and the Eisai Inc Clinical Advisory Board; Chief of the Scientific Advisory Board for SetPoint Health; and a co-principal investigator for LookAHEAD (NIH/National Institute of Diabetes and Digestive and Kidney Diseases DK05715). He also was the Chair of the Medical Care Panel for Weight of the Nation.

## REFERENCES

1. Flegal KM, Carroll MD, Ogden CL, Curtin LR. Prevalence and trends in obesity among US adults, 1999–2008. *JAMA* 2010;303:235–41.
2. Finkelstein EA, Khavjou OA, Thompson H, Trogdon JG, Pan L, Sherry B, Dietz W. Obesity and severe obesity forecasts through 2030. *Am J Prev Med* 2012;42:563–70.
3. Olshansky SJ, Passaro DJ, Hershow RC, Layden J, Carnes BA, Brody J, Hayflick L, Butler RN, Allison DB, Ludwig DS. A potential decline in life expectancy in the United States in the 21st century. *N Engl J Med* 2005;352:1138–45.
4. National Institutes of Health. Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults—the evidence report. *Obes Res* 1998;6(suppl 2):51S–209S.
5. Blackburn GL. Medicalizing obesity: individual, economic, and medical consequences. *Virtual Mentor* 2011;13:890–5.
6. Malandrucchio I, Pasqualetti P, Giordani I, Manfellotto D, De Marco F, Alegiani F, Sidoti AM, Picconi F, Di Flaviani A, Frajese G, et al. Very-low-calorie diet: a quick therapeutic tool to improve beta cell function in morbidly obese patients with type 2 diabetes. *Am J Clin Nutr* 2012;95:609–13.
7. Bistrian BR. Clinical use of a protein-sparing modified fast. *JAMA* 1978;240:2299–302.
8. Womble LG, Wang SS, Wadden TA. Commercial and self-help weight loss programs. In: Wadden TA, Stunkard AJ, eds. *Handbook of obesity treatment*. Vol. 19. New York, NY: Guilford Press, 2002;395–415.
9. Palgi A, Read JL, Greenberg I, Hoefler MA, Bistrian BR, Blackburn GL. Multidisciplinary treatment of obesity with a protein-sparing modified fast: results in 668 outpatients. *Am J Public Health* 1985;75:1190–4.
10. Wadden TA, Neiberg RH, Wing RR, Clark JM, Delahanty LM, Hill JO, Krakoff J, Otto A, Ryan DH, Vitolins MZ. Four-year weight losses in the Look AHEAD study: factors associated with long-term success. *Obesity (Silver Spring)* 2011;19:1987–98.
11. Centers for Disease Control and Prevention. Weight of the nation. Available from: <http://www.cdc.gov/features/weightofthenation/> (cited 13 September 2012).
12. Institute of Medicine of the National Academies; Food and Nutrition Board. Accelerating progress in obesity prevention: solving the weight of the nation. Available from: <http://www.iom.edu/Reports/2012/Accelerating-Progress-in-Obesity-Prevention.aspx> (cited 13 September 2012).
13. Hemmingsson E, Johansson K, Eriksson J, Sundström J, Neovius M, Marcus C. Weight loss and dropout during a commercial weight-loss program including a very-low-calorie diet, a low-calorie diet, or restricted normal food: observational cohort study. *Am J Clin Nutr* 2012;96:953–61.
14. Wadden TA, Stunkard AJ, Brownell KD. Very low calorie diets: their efficacy, safety, and future. *Ann Intern Med* 1983;99:675–84.
15. John LK, Loewenstein G, Volpp KG. Empirical observations on longer-term use of incentives for weight loss. *Prev Med (Epub ahead of print)* 8 Feb 2012.
16. Shapiro JR, Koro T, Doran N, Thompson S, Sallis JF, Calfas K, Patrick K. Text4Diet: a randomized controlled study using text messaging for weight loss behaviors. *Prev Med* 2012;Aug 27 (Epub ahead of print; DOI:10.1016/j.ypmed.2012.08.011).
17. Riley WT. Leveraging technology for multiple risk factor interventions. *Arch Intern Med* 2012;172:796–8.
18. Wadden TA, Webb VL, Moran CH, Bailer BA. Lifestyle modification for obesity: new developments in diet, physical activity, and behavior therapy. *Circulation* 2012;125:1157–70.