

## Primary Prevention of Weight Gain Is Essential to Promote Cardiovascular Health

Cheryl A. M. Anderson, PhD, MPH, MS; Tala Al-Rousan, MD, MPH; C. Michael Wright, MD

Type 2 diabetes mellitus is the seventh leading cause of death in the United States, affecting 9.4% of the population<sup>1</sup> with total costs of \$327 billion in 2017.<sup>2</sup> The management of weight and other risk factors for cardiovascular disease (CVD) in individuals with diabetes mellitus is critical since CVD is the most common cause of death in this population.<sup>3</sup>

In this issue of the *Journal of the American Heart Association (JAHA)*, Berger et al investigate the association of weight regain and change in cardiometabolic risk factors<sup>4</sup> using data from the Look AHEAD (Action for Health in Diabetes) study, a landmark lifestyle intervention trial in individuals with type 2 diabetes mellitus.<sup>5</sup> Look AHEAD was conducted from 2001 to 2012 and was designed to examine the effect of an intensive lifestyle intervention, targeting weight reduction through increased physical activity and calorie reduction, on CVD and risk factors for CVD.<sup>5</sup> This secondary analysis of the Look AHEAD trial data included individuals who lost  $\geq 3\%$  of their body weight during the 1-year study intervention period and who had data after 4 years of follow-up. In sum, they report that with weight loss cardiometabolic parameters will improve and with weight regain they will deteriorate. Although cardiometabolic risk factors improved after 1 year with initial weight loss, there was no meaningful improvement in cardiometabolic risk profile if weight loss was not maintained. These findings suggest that the benefit of weight loss on cardiometabolic

parameters is not sustained if weight is regained. Interestingly, those who lost weight and maintained it did not see further improvement in the cardiometabolic risk factor profile above and beyond the benefit that was gained initially—most of the benefit was gained quickly and plateaued.

In analyses stratified by sex, the differences reported in change of cardiometabolic risk factors differed for men and women, and results were not uniform, and even somewhat counterintuitive, across the risk factors. Furthermore, from this analysis we gain some insight into whether there are cut points for weight regain at which some people maintain benefit or have their risk factors worsen. However, the use of multiple testing procedures is a limitation that hinders clear interpretation of these interesting findings.

Another key finding is that with weight regain, cardiometabolic risk factors worsened to preintervention levels. This is significant given the interrelationship between type 2 diabetes mellitus and weight, with individuals who are obese having the highest risk of developing type 2 diabetes mellitus.<sup>6</sup> There is also a strong and consistent body of evidence showing that obesity management can delay the progression from prediabetes to type 2 diabetes mellitus, and may be beneficial in the treatment of type 2 diabetes mellitus.<sup>7</sup> Weight loss–induced improvements in glycemia are most likely to occur early in the natural history of type 2 diabetes mellitus when obesity-associated insulin resistance has caused reversible  $\beta$ -cell dysfunction but insulin secretory capacity remains relatively preserved.<sup>8</sup>

CVD risk factor control is important in managing type 2 diabetes mellitus<sup>9</sup> and novel lifestyle interventions are of interest. A recent large randomized controlled trial provided evidence that negative energy balance induced by moderate caloric restriction improves multiple cardiometabolic risk factors including waist circumference, blood pressure, high-density lipoprotein- and low-density lipoprotein-cholesterol, triglycerides, insulin resistance and glucose control, metabolic syndrome, and chronic inflammatory tone.<sup>10</sup>

Efficacious weight loss interventions like the one used in Look AHEAD typically have participant goals for weight, calories, diet, and exercise. These interventions also usually

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From the Departments of Family Medicine and Public Health (C.A.M.A., C.M.W.) and Medicine (C.A.M.A., T.A.R.), University of California San Diego School of Medicine, La Jolla, CA.

**Correspondence to:** Cheryl A. M. Anderson, PhD, MPH, MS, 9500 Gilman Dr, MC 0628, La Jolla, CA 92093-0628. E-mail: c1anderson@ucsd.edu  
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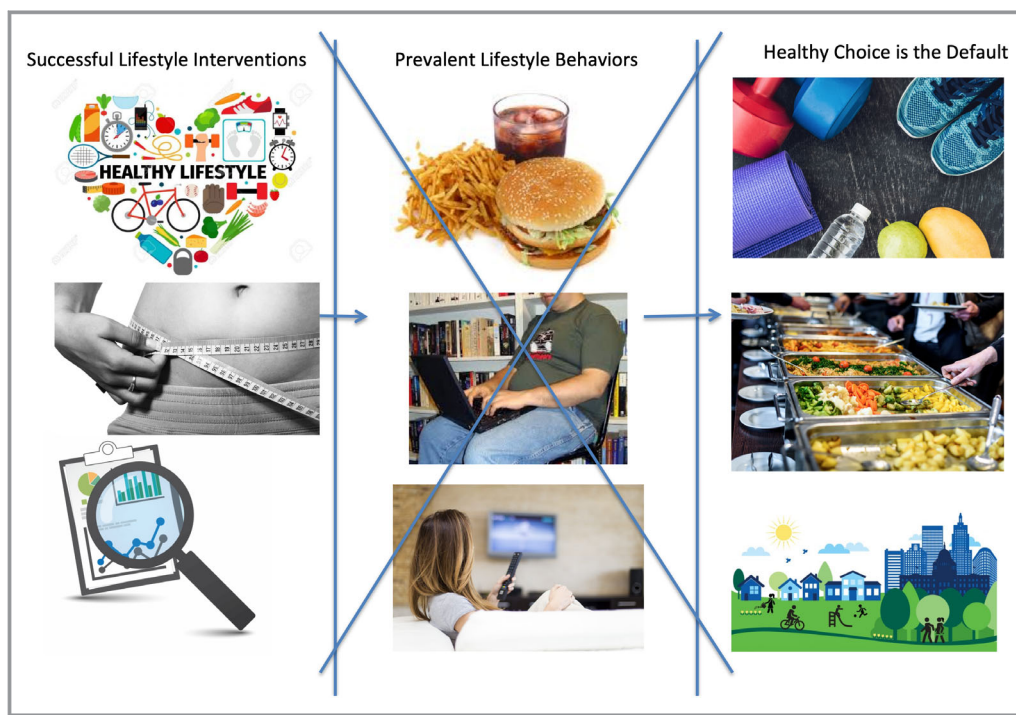
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share common characteristics: an early intensive phase with frequent contact, typically weekly during the initial months; self-monitoring of calories, exercise, and weight with routine feedback; accountability; problem solving; motivational interviewing; self-efficacy and social support; and include flexible approaches for different kinds of learners. Occasionally, as in Look AHEAD, meal replacements may be given to help study participants with portion control and calorie estimation. Discussions with study participants are usually led by interventionists or health coaches and cover topics such as self-monitoring, energy balance, healthy lifestyle changes, problem solving, time management, stress management, and relapse prevention. This approach is successful in the short term and these studies consistently show that weight loss, even if modest, is associated with reduced cardiometabolic risk and improved overall cardiovascular health.<sup>5,11–15</sup> However, maintenance of this lost weight presents a substantial challenge and, in long-term follow-up of participants a checkmark pattern (“✓”) has been observed; showing weight regain after the initial weight loss.

On the one hand, the findings by Berger et al may be viewed as discouraging given the lack of sustainability of weight loss and concomitant loss of the early metabolic benefits of intensive lifestyle intervention. On the other hand, it could be argued that these findings are not surprising given that “obesogenic environments” seem common, and there are persistent challenges to adherence to diet<sup>16</sup> and activity<sup>17</sup>

guidelines. As shown in Figure, although study participants can experience success in the carefully executed intensive lifestyle interventions in research studies, once the study ends and they return to their typical routines, they are likely to be confronted with cheap, convenient, nutrient-poor and calorically dense foods, and ample opportunities to be sedentary. Substantial change and innovation is needed to facilitate changes so that healthy lifestyle choices become normative behaviors. Furthermore, if we consider these findings in light of the significant disparities in cardiovascular health factors in the United States, the implications are ominous. Every year 1.5 million Americans are diagnosed with diabetes mellitus.<sup>1</sup> The prevalence rates of diabetes mellitus vary by race and ethnicity and are 15.1% for American Indians/Alaskan Natives, 12.7% for non-Hispanic blacks, 12.1% for Hispanics, and 11.2% for Asian Indians.<sup>1</sup> Poverty rates, socioeconomic status, and geographic location are also important determinants of weight status and cardiovascular health.

Given their findings, Berger et al conclude that intervention programs should focus not only on weight loss, but also on maintenance of weight loss. While lifestyle interventions are important for weight loss, we assert that there is also a need to consider other influences on weight, such as genetics, physical environment, social environment, and public health policies. The findings from the work of Berger et al beg the question of what population strategies would be most



**Figure.** Preventing weight gain by making healthy lifestyle choices the default.

effective to sustain ideal body weight and favorably impact cardiovascular health. It is not easy to achieve healthy dietary patterns that emphasize vegetables, fruits, and whole grains; include low-fat dairy products, poultry, fish, legumes, non-tropical vegetable oils, and nuts; and limit intake of sweets, sugar-sweetened beverages, and red meats. Nor is it easy for adults to meet the current physical activity guidelines, which include at least 150 minutes per week of moderate-intensity exercise; and muscle strengthening on 2 or more days per week. The challenge of enabling healthier food choices will require innovation and alliances at all levels of the food system including novel approaches for individuals, communities, the medical sector, the public health sector, and the interplay between government and the for-profit food industry.<sup>18</sup> Changing the environmental context may be a critical component for preventing weight gain, insulin resistance, and the development of type 2 diabetes mellitus, thereby positively impacting long-term cardiovascular health.

## Disclosures

None.

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**Key Words:** Editorials • diabetes mellitus • diet • lifestyle • physical exercise • prevention • weight loss