

Position of the American Dietetic Association: Weight management

ABSTRACT

It is the position of the American Dietetic Association that successful weight management to improve overall health for adults requires a lifelong commitment to healthful lifestyle behaviors emphasizing sustainable and enjoyable eating practices and daily physical activity. Americans are increasing in body fat as they become more sedentary. Obesity has reached epidemic proportions and health care costs associated with weight-related illnesses have escalated. Although our knowledge base has greatly expanded regarding the complex causation of increased body fat, little progress has been made in long-term maintenance interventions with the exception of surgery. Lifestyle modifications in food intake and exercise remain the hallmarks of effective treatment, but are difficult to initiate and sustain over the long term. The dietitian can play a pivotal role in modifying weight status by helping to formulate reasonable goals which can be met and sustained with a healthy eating approach as outlined in the Dietary Guidelines for 2000. Any changes in dietary intake and exercise patterns which decrease caloric intake below energy expenditure will result in weight loss, but it is the responsibility of the dietitian to make sure the changes recommended are directed toward improved physiological and psychological health. A thorough clinical assessment should help define possible genetic, environmental, and behavioral factors contributing to weight status and is important to the formulation of an individualized intervention. The activation of treatment strategies is often limited by available resources and cost. Reimbursement by third party payers for services is limited. Health care dollars are consumed for treatment of weight-related diseases. Public policy must change if the obesity epidemic is to be stopped and appropriate weight management techniques activated.

In the past decade, our growing knowledge of the genetic, physiological, psychological, metabolic, and environmental influences on body weight has increased our awareness of the complexities of weight management. New research has provided a basis for evaluating our traditional intervention strategies and outcome goals. Americans are gaining weight at an alarming rate (1). Obesity is rapidly becoming an epidemic in this country. A sedentary life coupled with access to an abundance of energy-dense food has led to an increase in this chronic disease with national health care costs reaching \$70 billion per year (2,3).

Currently, available data on lifestyle weight loss interventions indicate that they produce low levels of sustained loss (4). Typically reported weight losses remaining after 4-5 years are about 3% to 6% of initial body weight (5). A 5% weight loss does have health benefits and counters weight gain that may have occurred if one had not been involved with weight loss strategies. There is a prevailing need for dietetics professionals and other health care professionals to document outcomes on weight loss programs/interventions, since there is limited data from commercial, hospital, and other interventions. Many people are spending a considerable amount of money on weight loss programs, and outcome data is needed to document the effectiveness of these. For most people who are overweight or obese, treatment recommendations are based on decreasing caloric intake, increasing physical activity, and making permanent, healthy lifestyle changes. Self-reports from individuals who lose weight and keep it off on their own, without professional support, indicate that these individuals are able to sustain changes in physical activity and food intake over time (5-7). Evaluating the efficacy of weight management strategies depends on identifying outcome goals. Traditionally, evaluation has been on total weight loss; it is now realized that prevention of weight gain as well as weight loss and

improving health status are important goals. We must move away from assuming that weight management is synonymous with the achievement of slenderness. Rather than recommending an unrealistic weight loss which is usually not achieved or maintained, patients must be helped to achieve and accept a healthier weight and adopt healthier lifestyles that lead to reducing health risks (8).

Given our current obesity-conducive environment, significant change will require a concerted effort by both public and private sectors to address the environmental contributors to both childhood and adult obesity. Dietitians and other health care providers also have a responsibility to address these public health issues. While this paper doesn't specifically concentrate on pediatric and adolescent obesity, the general concept about lifestyle can apply to this population.

POSITION STATEMENT

It is the position of the American Dietetic Association that successful weight management to improve overall health for adults requires a lifelong commitment to healthful lifestyle behaviors emphasizing sustainable and enjoyable eating practices and daily physical activity.

THE COMPLEX ETIOLOGY OF OBESITY

In the remainder of this paper, the word "obesity" will be used primarily in a qualitative manner to refer to the body's level of adiposity. This qualitative use of the term reflects the continuum of etiology and outcomes across levels of increased fatness. Although some professionals use the term "obesity" in a quantitative way to refer to extreme levels of fatness, that will not be the prominent use here. Obesity develops from an interaction of genetic and environmental factors and is a complex multifactorial chronic disease (9).

Biology

Body weight is tightly regulated (10). Increased fatness results from the failure of this sophisticated regulatory system that balances total energy intake and expenditure. High levels of fatness are induced by combinations of genetic, environmental, and psychological influences. It is likely that obesity represents the manifestations of a spectrum of disorders, each arising from distinct defects or groups of defects in the cortical, hypothalamic, endocrine and/or metabolic components of the weight regulatory system (11-13). Understanding of the biological basis of obesity has been substantially advanced in the past decade due to the discovery of several genes that regulate body weight (14-15).

Genetics

Advancements in the field of genetics and obesity may lay the groundwork for the development of effective pharmacotherapy. Evidence for a strong genetic contribution of human obesity comes from a variety of sources. Twin and familial aggregation studies suggest that genetic factors account for 60% to 80% of the predisposition to obesity (16-19). The genetic basis of obesity has also been shown in animal studies. In general, genes that influence body weight encode the molecular components of the physiological system that regulates body weight. In animals single-gene mutations usually produce massive obesity (20). The ob gene or leptin gene codes for a protein called "leptin." Leptin is a circulating hormone secreted by fat cells that signals the level of energy reserves to the hypothalamus. Cloning of the leptin gene was a breakthrough in under-

standing one form of obesity that has been identified in humans (21,22). Nearly all individuals with obesity exhibit an excess of circulating leptin in direct proportion to their body mass index. Thus human obesity appears to result from functional resistance to the effects of leptin, much as type 2 diabetes reflects resistance to the physiological effects of insulin. Studies have shown that metabolic rate, thermic response to food, and spontaneous physical activity show genetic components (19,23-24). There are at least several dozen genes involved in obesity, and not only does current weight status have an inherited component, but the metabolic processes underlying weight gain may have strong genetic influences (25). Furthermore, as the ethnic makeup of the United States population undergoes rapid change, we may see differences in the relative genetic contributions to weight status. Although environmental influences are certainly a factor in the reported ethnic differences in adiposity, significant differences remain even when socioeconomic status has been controlled (26-28). It is important to recognize that the genetic expression of obesity occurs in an environment that permits the expression of the propensity to store body fat.

Environmental

Initial results from the 1999 National Health and Examination Study (NHANES) using measured heights and weights indicate that an estimated 61% of US adults have excess body fat. This represents a prevalence that is 5% higher than the age-adjusted overweight estimates obtained in NHANES III (1988-1994) (1). These changes demonstrate that despite the importance of genetics in determining predisposition to obesity, development of obesity itself is strongly influenced by environmental triggers (16,29). Environmental influences include an overall decrease in physical activity. As technology advances, the use of convenient tools significantly reduces the energy costs of the activities of daily living and, therefore, total energy expenditure. At this same time, there has been an increase in food availability. With the advent of fast and convenience foods, there has also been an increase in the caloric density of readily available foods coupled with aggressive and sophisticated food marketing by the mass media. In addition, there has been a significant increase in the portion size of food as it is sold and served (30). Our lifestyles have become increasingly more stressful. Americans are working longer hours outside the home which limits the time and emphasis on food planning and preparation, often leading to chaotic patterns of eating and the decrease in planned, relaxed home meals (29). As the environment promotes increased caloric consumption and decreased physical activity, Western culture places a value on attractiveness and interprets slenderness as essential to attractiveness. This interpretation of attractiveness demands conformity to a narrow definition and leaves no room for individual differences. It indicates that those who fail to conform will be denied success, love, power, and other rewards. These values may lead to an obsession with thinness among some. Thinness can be a motivator to change eating and exercise behaviors, but, in fact, the changes are most often extreme and short-lived. The resulting changes in body size and shape do not usually satisfy the emotional need, and the frustrated individual continues to alternate between weight loss and weight gain. Thus, the cultural and physical environments contribute to difficulties in weight management by focusing on an unrealistic thinness, promoting increased caloric consumption and decreased physical activity, and establishing conditions whereby the genetic

predisposition for increases in body weight are more likely to be expressed.

Medications

Several classes of psychotropic medications are associated with unwanted weight gain including antipsychotics, antidepressants, mood stabilizers, and to a lesser degree anxiolytics (31). In general the medications that block receptors for histamine H1, Serotonin 5-HT, and dopamine, all known to be important in weight regulation, are associated with weight gain (31). Weight gain is commonly reported for the frequently prescribed mood stabilizers like lithium and anticonvulsants including valproic acid and carbamazepine (32). Alternative choices are available, and a newer medication, topiramate, has been associated with mild, dose-related weight loss. Compliance becomes problematic for tricyclic antidepressants and monoamine oxidase inhibitors (MAOIs) with weight gain. Newer antidepressants are now available without that untoward effect (31). When treatment is initiated with selective serotonin reuptake inhibitors (SSRI), weight loss sometimes results, but changes in long-term weight status have not been well studied. Other medications that also may cause weight gain include steroids, cyproheptadine, and insulin. If the dosage of these medications is reduced or discontinued, the weight increase may resolve.

Psychological Status

Dysphoric mood state and weight status are frequently related (31). The data analysis from the National Health Epidemiological follow-up study to the first National Health and Nutrition Survey revealed that depression played a substantial role in the patterns of weight change in US adults (34). Persons who gain weight with one episode of depression tend to gain weight with the next, just as persons who tend to lose weight with depression have a similar response with the next occurrence of depression (35). The use of medications to modify psychiatric dysfunction with resultant weight modification is discussed above (31). Studies have indicated that brain serotonin is critically involved in controlling mood, and many patients learn they can transiently reduce depressive symptoms by eating. This is frequently seen in seasonal affective disorder, premenstrual syndrome, and nicotine withdrawal (36).

ASSESSMENT OF OBESITY

Assessment of weight and health should guide weight management goals and document outcomes (Figure). Clinically useful measures of body weight are measures that are highly correlated with risks to physical health, are non-invasive, easy to use and inexpensive, as well as reliable and capable of reflecting short- and long-term changes in body fat. The standard measurement for weight status is the Body Mass Index (BMI), estimated by weight (kg) divided by height (m²). Overweight is defined as a BMI of 25-29, whereas higher BMI values reflect more excessive amounts of body fat (37). There are differences even in the community of experts as to the BMI at which an individual is at greater health risk. Some advocate weight loss by individuals with a BMI of 25-29 but debate how much weight reduction should be recommended (38). The National Heart, Lung and Blood Institute (NHLBI) guidelines recommend intervention for overweight individuals who have two or more risk factors associated with their weight status (39). The US Dietary Guidelines recommend individuals work toward weight reduction if they are even mildly overweight.

A. ANTHROPOMETRICS

- height
- weight
- BMI
- waist circumference

B. MEDICAL

Identify potential causes: endocrine/neurological; medications; genetics (age of onset; family weight history)

Identify obesity-associated disorders (current complications and risks of future complications): polycystic ovary syndrome; medical complications—metabolic, anatomic, degenerative, neoplastic

Identify severity of obesity and extent of physical disability

D. PSYCHOLOGICAL

Potential psychological causes: psychotropic medications; depression; post traumatic stress disorder; addictive behavior

Eating disorders: binge eating disorder; bulimia

Assess risk of potential psychological barriers to treatment: psychiatric history—suicidal ideation; untreated psychological disorders

C. NUTRITIONAL

Weight history: age of onset, highest/lowest adult weights, patterns of weight gain and loss, environmental triggers to weight gain; triggers to excessive or disordered eating

Diet history: number and types of diets; weight loss medications; complementary and alternative approaches for weight loss, success of previous weight loss efforts

Current eating patterns: meal patterns, 24-hour recall/food frequency

Nutritional intake: nutrient density, nutrition supplements; vitamin/mineral supplements

Environmental factors: meals eaten away from home; fast foods; restaurants; ethnic foods; location of meals; types of foods; meals skipped, largest meal; snacks/grazer; lifestyle—time restraints; financial restraints

Exercise history: current structured exercise; activities of daily living; past exercise; barriers to exercise

Motivation and readiness to change: motivation for wanting to lose weight at this time; goals for weight loss; readiness for making changes; willingness to undertake effort; support systems

FIG Weight management assessment

The 2000 edition of the US Dietary Guidelines is more directive about weight loss than were previous editions, stating that people who are overweight should “lose weight to improve your health.” It also provides for the first time, a box entitled “Find out your other risk factors for chronic disease.” Readers are advised that “the more of these risk factors you have, the more you are likely to benefit from weight loss if you are overweight or obese” (40).

The presence of excess fat in the abdomen out of proportion to total body fat is an independent predictor of risk factors and morbidity. To determine the distribution of body fat, waist circumference is used. Waist circumference is positively correlated with abdominal fat and provides a clinically acceptable measurement for assessing a patient’s abdominal fat before and during weight loss treatment. Waist circumference is most useful when BMI is less than 35 and is more predictive of illness risk than BMI after age 65 and in Asian-American populations (41). High risk is associated in men with a waist circumference > 40 inches and in women > 35 inches (42).

A thorough clinical assessment is essential for making appropriate recommendations for intervention. From a clinical perspective, there appear to be many manifestations of increases in weight status that may reflect different physiological mechanisms and environmental influences. By assessing and documenting clinical characteristics such as distribution of body fat, age of weight increases, presence of comorbid diseases, environmental influences and psychological factors that may have influenced an individual’s weight, the provider can develop a more individualized therapeutic approach. Patients tend to respond better to treatments that are directed toward their personal needs. In determining these needs, it is essential to involve the patient as a partner to utilize a process that considers his or her values and goals, readiness for change and personal and environmental resources.

The *medical* assessment of obesity should be done by the primary care physician and should include height, measured every 5-10 years, weight, and waist circumference.

The medical examination should rule out organic causes and assess health risks and/or the presence of weight-related complications (43). Weight-related complications may be divided into 4 categories: a) metabolic complications (diabetes, hypertension, high cholesterol, gallstones, reproductive dysfunction, thromboembolic disease); b) anatomic complications (obstructive sleep apnea, reflux disease, venous insufficiency, stress incontinence, injuries); c) degenerative complications (arthritis, disc disease, atherosclerotic disease, pulmonary hypertension), and d) neoplastic complications (colorectal, esophageal, adenocarcinoma, endometrial, breast, prostate, ovarian) (44). Cardiorespiratory fitness and screening for musculoskeletal problems may need to be assessed prior to designing a program of physical activity.

In addition to a medical assessment, a *psychological* assessment may be indicated. A psychological assessment may include screening for barriers to successful weight loss such as depression, post-traumatic stress disorder, anxiety, bipolar disorder, addictions, binge eating disorder and bulimia (45,46).

A complete *nutritional* assessment would include an assessment of current intake including use of supplements, herbs, and over-the-counter weight loss aides, as well as meal and snack patterns. The weight and dieting history should include age of onset of fatness, number and types of diets, possible triggers of weight gains and losses, and range of weight change. An assessment of readiness for weight loss and

motivation should also be done in addition to assessing possible barriers to treatment such as physical limitations, knowledge, and skills, presence or absence of support systems (family, friends), time availability, and financial considerations (47).

Current *physical activity* level should be assessed, including exercise frequency, intensity and duration as well as the individual’s attitude toward physical activity. Is the patient motivated to begin a program of increased physical activity? What are the barriers to beginning an exercise program? Since Americans are engaged in more sedentary activities, increasing physical activity may contribute to weight management. Regardless of the effects exercise has on weight loss, there is strong evidence that increased physical activity increases cardiorespiratory fitness with or without weight loss (48-50).

For effective weight management treatment, the client should be assessed by a multidisciplinary team, including a physician, registered dietitian, exercise physiologist, and a behavioral therapist. Through the team approach, issues such as nutrition, physical activity, and change in eating behavior can be coordinated. Although this approach may be ideal, the increased cost of employing a multidisciplinary team, the lack of third party reimbursement, and the absence of experienced weight management health care professionals are potential barriers to this option. However, once the primary care physician has determined that the client would benefit from the expertise of the team, the appropriate referrals can then be made. Health care professionals in the weight management arena should network with physicians to build a referral base. Additionally, the network should form a weight management team that would partner with the client to develop an individualized treatment program to promote successful outcomes.

All health care providers should be sensitive to the needs of their obese clients. Many obese patients require appropriately sized blood pressure cuffs, wide-based armless chairs, and scales that measure individuals greater than 350 pounds.

Successful weight loss may require ongoing encouragement and support from the weight management team. Depending on the amount of follow-up, continued visits with health care providers increases the costs of treatment. Active lobbying is needed by all health care professionals to improve health care policies, community resources, and third party reimbursement for weight management services, especially so such services become available to minority populations. Until such changes occur, the client should be apprised of the importance of losing weight for the overall health benefits associated with maintaining a healthy weight and that out-of-pocket expenses may be necessary.

GOALS OF WEIGHT MANAGEMENT INTERVENTIONS

At the outset of treatment, the patient and health care provider should discuss and agree upon goals. The clinician needs to avoid overpowering advice inferring “do as I say” versus empowering advice such as “pay attention to what you want to do; trust yourself in this process.” With such an attitude the provider and the patient will develop a relationship of *shared* responsibility. Realistic expectations, short- and long-term, may be fostered by a discussion of a healthy weight versus an ideal body weight. Goals of weight management interventions may include:

- prevention of weight gain or stopping weight gains in the individual who has been seeing a steady increase in his or her weight (51);

- varying degrees of improvements in physical and emotional health (52);
- small maintainable weight losses or more extensive weight losses achieved through sensible and tolerable eating and exercise behaviors (53); and
- improvements in eating, exercise, and other behaviors apart from any weight loss.

Expectations and recognition of the time required to make sustainable behavior changes must also be discussed. To enable potential patients to make an informed decision to begin treatment, the program's success in assisting patients in meeting various types of goals needs review.

Health can be improved with relatively minor weight losses. A weight loss of 10% may ameliorate health risks associated with excessive body weight (54). A challenge to health care providers is helping patients to accept a 10% weight loss. Some patients, encouraged by a "thin obsessed" society, want to set unrealistically low weight goals (55). Size acceptance, which emphasizes the positive aspects of one's body and its appearance, while realistically appraising and accepting the more negative aspects, may need to be addressed. This requires challenging value systems that make appearance one of the most important aspects of life. Appearance, in many patients, will be an important motivator; however, it is critical that the dietitian and other health care providers emphasize the goal of achieving a healthier weight and lifestyle, while de-emphasizing cosmetic goals.

Setting treatment goals and documenting before and after measures is an important aspect of patient care. Whatever goals of treatment are set by the practitioner and the patient, before and after measures of those goals should be tracked to encourage positive health behaviors and acknowledge progress toward those goals. Clinical measures such as before and after weight, laboratory values, and blood pressure should be documented. Batteries of measurement tools are needed to monitor progress in self-esteem, self-efficacy, body image, size acceptance, and sense of control over eating (56-57). Tracking outcomes will not only allow the dietitian and patient to monitor change but can contribute to the evaluation of the efficacy of the program. Outcomes measures, other than absolute weight, should provide the patient with continued motivation and demonstrate to the individual that he or she has achieved positive behavior change.

INTERVENTIONS

Diet and Lifestyle Modifications

There exists a continuum in philosophy and clinical practice as to what extent externally controlled modification of weight status should be attempted (58,59). This continuum ranges from complete reliance on internal control to increased external structural supports provided by the prescription of diets, meal plans and exercise protocols. Internally regulated approaches are referred to by various names including non-dieting, normalized eating, or intuitive eating. These approaches are based on an assumption that the body knows best and have in common that they urge that food intake be guided by internal clues to hunger and satiety. There may be great variability among individuals in the extent to which they are able to perceive and act upon internal cues. Lengthy intervention may be required to learn to perceive internal signals of hunger and satiety and to develop the trust to allow these signals to guide food intake. Emotional associations with food

and eating complicate the sensations that offer internal guidance; when these associations are extreme, therapy for emotional issues is indicated. The body's regulatory systems resist changes in fatness by adjusting control systems. In addition, there may be a failure of the regulatory system in the body that controls either hunger or satiety or both, making it difficult for an individual to rely on this method. Internal regulation of food intake is most often used with patients who are seeking to stabilize their weight and to address other issues associated with their eating and weight. Programs that have utilized it have demonstrated short-term improvements in self-esteem, body image, and other parameters associated with psychological well-being (53,60). Long-term, randomized, controlled studies with sufficient numbers of participants are not available to validate this approach.

Moderate or mixed approaches promote internally guided eating in combination with limited external guidance systems. Based on the observation that internal guidance of food behavior is difficult given most peoples' experiences and environment, this moderate approach provides structural supports even while urging that individuals respond to their own cues of hunger and satiety. There is no available data to support the proposition that adults experience food or nutrient-specific appetites that lead infallibly to a balanced diet. Readily available foods tend to be high in fat, calories, salt, and sugar, making the consumption of such foods more likely. A moderate approach would teach patients to provide themselves with high volume, nutrient-dense but not calorie-dense foods in a balanced array and to then allow their hunger and satiety to guide them in choosing quantities. Teaching awareness of one's eating, both the amount eaten and the sensations produced, is important. This approach emphasizes moderation, balance, and common sense and should reduce feelings of deprivation (61). It is most often accompanied by advice concerning exercise, stress management, and self-acceptance. The outcomes of these approaches depend upon the original goals. Theoretically, such a moderated approach should lead to changes in eating and exercise behaviors that can be sustained and will lead to slow continued weight losses. There has been little documentation of the long-term effectiveness of this combined approach. However, data from the Continuing Survey of Food Intakes by Individuals 1994-1996 was analyzed to look at dietary patterns and selected measures of nutritional status and Body Mass Index. This analysis found that individuals on a moderate fat, high-carbohydrate diet as recommended by the Food Pyramid Guide were more likely to maintain weight loss (62).

Externally based systems range from severe caloric restriction, very low calorie diets (< 800 calories per day), to low-calorie diets (estimated energy expenditure minus 500-1,000 calories per day) to guide food intake. These systems are based on the assumption that not all individuals are able to internally control their food intake to the extent of achieving a healthier weight and therefore must rely on external guidance and increased structural supports. Data regarding severe energy restricted diets, such as very low calorie diets (VLCDs), show that despite the short-term success of achieving significant weight losses, there is poor long-term maintenance of losses (63). It has been well documented that use of the low-calorie diets, typical of a modified approach, can produce mean weight losses in the range of 8% to 10% of body weight over a period of 6-12 months (64). Unfortunately, it is also well documented that unless individuals sustain the diet plus exercise indefi-

nately, most of the losses are regained (65). Patients who have realistic weight loss goals (5% to 10% weight loss), have never dieted, are trying to modify very poor food habits, are seeking external supports and increased structure, and accept the need for a sustained effort may benefit from diets mildly reduced in calories accompanied by a regular exercise program.

Diets

Multiple approaches to the modification of caloric intake have been tried. Diets can be classified as: starvation (0-200 kcal/day); very-low calorie (200-800 kcal/day) or low calorie (> 800 kcal/day) (66). Starvation diets include fasting, which has been used for centuries and results in a loss of lean body mass and mineral loss due to diuresis. VLCDs are protein-sparing modified fasts using either a premixed liquid or meat, fish, or poultry. VLCDs come and go in popularity often according to the push of a commercial program or book. Generally, in a medical environment, they are reserved for patients who have BMIs > 30 and have failed other approaches. Patients should be under medical supervision and must receive supplemental vitamins and minerals (63). It has been established that the weight losses over time are not greater than a mixed diet of equal caloric content, and the resumption of eating solid foods frequently disrupts maintenance efforts (67,68).

More commonly used interventions are *low-calorie diets* that modify the macronutrient composition of the diet. Low-calorie diets emphasize portion control in an effort to reduce energy intake below the level of energy expended. For balanced, deficit diets, the treatment protocol must be adapted to the needs of the patient. However, usually an energy deficit of 500-1000 calories per day is planned for individuals with the expectation that a weight loss of 1-2 pounds per week will occur. The reduction of saturated fat is advised with a total fat intake of less than 30% (69). It is important that total calories are reduced, not just total fats, or little weight change will result (70). Of greatest importance is stressing "healthy eating" advised for all Americans according to the Food Pyramid Guide and the US Dietary Guidelines. Dietary planning and employing caloric dilution to keep the volume of food up while reducing total calories, may decrease feelings of deprivation and restriction.

Meal replacements are another category of calorie-controlled diets. Individuals replace a meal with a liquid drink that contains approximately 200 calories per serving and approximately 50% to 60% carbohydrate, 30% protein, and 10% fat or a pre-measured frozen meals of a set caloric value. The replacements help keep calories under control and probably, more importantly, reduce sensory stimulation and the need to make decisions about portion size. The patient must be individually motivated to adhere to a pre-measured meal plan on a long-term basis and accepting of the small sustained changes in weight status, 3.2% to 8.4% over four years (71).

Patients often are attracted to diets and programs that promise magical, no-stress weight loss. Although these programs have no metabolic validity, their promises are appealing. This has led to a weight loss industry in this country in excess of \$30 billion per year. It must be acknowledged that such programs do modify food intake and produce weight loss not because of the claims given, but because of the energy deficit. Although many have short-term success, these diets are often unbalanced and deficient in certain nutrients and may be excessive in others (72). A recent *Obesity Research* supple-

ment "Popular Diets: A Scientific Review," by Freedman, King, and Kennedy provides a compendium of the scientific data regarding the implementation of these popular diets (73).

Physical Activity

The lack of energy expenditure in our society today is one component of energy balance which underlies the pathogenesis of obesity and the overall principles for treatment. Physical activity or exercise is highly recommended as an essential component of the intervention plan to promote weight loss (74,75). Not only does physical activity contribute to weight loss by altering energy balance, but also favorably affects body composition, risk for disease, mood and quality of life. Regular physical activity also appears to be one of the best predictors of successful weight maintenance (76). Therefore, the importance of physical activity in the role of weight management and overall health cannot be overlooked.

It is well established that physical activity during weight loss can favorably affect energy balance and body composition (74,77). Weight gain results from a positive energy balance. Daily physical activity alters energy balance not only by increasing energy expended, but without exercise, loss of lean body mass with dieting alone contributes to a decrease in metabolic rate. Physical activity has been shown to aid in the preservation of lean body mass during weight loss (78,79). The addition of moderate physical activity to restriction of energy intake in promoting weight loss, has been shown to limit the loss of lean body mass to less than 10% (79). Maintaining or minimizing the loss of fat-free mass during periods of restricted energy intake appears to be particularly beneficial, since fat-free mass is the most important factor influencing resting metabolism (74). Furthermore, the addition of resistance training to aerobic activity reportedly enhances body composition further (78).

Physical activity also may positively influence the distribution of body fat independent of its effect on body weight (74). Although an increase in overall body fat is considered a risk for chronic disease, an increase in visceral abdominal fat has been identified as even a stronger independent risk factor for the development of type 2 diabetes, coronary heart disease, hypertension and some cancers than general obesity (80). Despite the fact that the combination of dieting and physical activity has been shown to reduce visceral abdominal fat, several studies have shown the benefit of exercise alone in reducing visceral abdominal fat. This is particularly important since the risk for disease is thereby reduced. (80,81). Physically active individuals have also been found to have lower waist-to-hip ratios in comparison to sedentary individuals (80,82).

The combination of weight loss and physical activity has consistently been shown to convey additional health benefits by improving the metabolic parameters associated with chronic disease. Weight loss and exercise together reduce total cholesterol, low-density cholesterol, triglyceride, plasma insulin, and blood glucose levels thereby reducing the risks for metabolic syndrome, type 2 diabetes, and heart disease (74,80,75,83). It is important to note however, that regardless of whether weight is lost or not, overweight and obese individuals receive significant health benefits associated with daily physical activity (83,84). Overweight or obese individuals who achieve cardiorespiratory fitness have been shown to have a lower all-cause morbidity and mortality risk than sedentary individuals of normal weight (83,84). Many times, despite the lack of weight loss, metabolic parameters such as insulin, glucose, and triglyceride levels are also improved with

exercise alone (80,85). Therefore, daily physical activity should be encouraged for all individuals not only for weight loss or weight maintenance but to improve overall general health through the prevention and reduction of risks for chronic disease.

Pharmacotherapy

Currently there are few pharmacotherapy options available for long term usage. Medications that have been approved by the FDA for treatment of "clinically significant" obesity (BMI > 30 or BMI 27-29 with one or more obesity-related disorders.), include sibutramine and orlistat. Sibutramine (Meridia) is a centrally acting serotonin and adrenergic reuptake inhibitor. It has the potential complication of hypertension and increased heart rate. Orlistat (xenical) is a pancreatic lipase inhibitor which inhibits the absorption of up to 30% of dietary fat. Steatorrhea, bloating and distension, and anal leakage are potential complications, and one must be alert for possible fat-soluble vitamin deficiencies. Reported losses with these medications combined with a low-calorie diet average 2-10 kg per year, and if the medications are discontinued weight gain results (86). Amphetamine-like derivatives: mazindol, phentermine, benzphetamine, phendimetrazine are available only for short-term use. When weight loss drugs are prescribed they should be only as part of a comprehensive treatment plan including behavior therapy, diet, and physical exercise (87). The herbal preparations for weight loss do not have standardized amounts of active ingredients and have been reported to have harmful effects (88,89). Certain over-the-counter preparations containing propanolamine (Dexatrim and related compounds) have no proven efficacy for short- or long-term weight loss and are being recalled because of the incidence of hemorrhagic stroke (90,91). Ephedrine plus caffeine, and fluoxetine have been tested for weight loss, but not approved and over-the-counter and herbal preparations are currently not recommended (92).

Pharmacotherapy research is currently focusing on three approaches, a) inhibitors of energy intake (appetite suppressants, orexins/hypocretin antagonists); b) enhancers of energy expenditure, UCP2 and UCP3 uncoupling proteins; and c) stimulators of fat mobilization (93). Leptin is now in the process of phase 2 testing, but to date, data do not indicate leptin has the potential for being the much sought after magic bullet to modify weight status (94).

Surgery

During the past 25 years, gastric surgery has been shown to be the most effective approach for generating long-term weight loss in extremely heavy persons. More than 90% of patients experience significant (> 20% to 25%) weight loss, and between 50% and 80% maintain weight loss for over 5 years; in contrast, the 5-year efficacy of other approaches is approximately 5% (95). Surgical procedures promote weight loss both by restricting food intake and causing malabsorption. Food intake may be reduced by the placement of a band (gastric banding), which allows only a small amount of food to enter the stomach or by the placement of a band plus staples to create a small pouch (vertical banded gastroplasty). Gastric bypass operations, Roux-en-Y gastric bypass, and the extensive gastric bypass (biliopancreatic diversion, with duodenal switch), create a small pouch by stapling or removal of portions of the stomach, and also bypass the duodenum and other segments of the small intestines thus producing some extent of malabsorption. These procedures have acceptable operative risk, 1% to

2.5% death rate, but require lifelong medical follow-up and monitoring to avoid and manage possible complications (4). Although bariatric surgery has made major advancements in the last 30 years, the effect on the human body of the weight loss produced requires investigation.

Prior to surgery, patients should be fully evaluated by a multidisciplinary team, including but not limited to a medical doctor, psychiatrist, and a dietitian. The role of the dietitian is important in screening to evaluate weight history, efforts to lose weight, food preferences, and food related behaviors, ie, binge eating to assist in electing the optimal procedure for the patient. The patient should be motivated to accept the responsibility for sustaining lifestyle changes to maintain weight loss and decrease post-operative complications.

The development of laparoscopic techniques has significantly reduced the frequency of complications with wound infection, which was the most common complication (5% to 20%), and the length of hospital stay. Data is available for a 5-year follow-up for standard open procedures but long-term follow-up of laparoscopic procedures is not yet available (96). It is of note that surgery appears to rule over genetics in weight loss responses and maintenance (97).

Accepted indications for surgical weight loss therapy are having a BMI > 40 or BMI 35-39 with one or more obesity-related disorders; and having previously unsuccessful non-surgical attempts at long-term weight management. Weight loss surgery is most effective when accompanied by pre- and post-operative comprehensive therapy to modify eating and exercise behavior. Such adjunctive therapy increases the likelihood of long-term success and should be a standard component of surgical weight management (98).

Liposuction is another form of surgery with a focus on adipose tissue. Its purpose is cosmetic, to alter body contours, and it should not be considered as a surgical procedure for weight loss (99).

Relapse Prevention

Clearly, preventing regain of fat losses is the major challenge of weight maintenance. Among the limited numbers of programs that do long-term follow-up, many find that losses are completely regained within 3-5 years (100). A successful program is often defined as one that produces maintenance of loss of at least 5%, or 6.6 kg of body weight (101). NIH recommends that maintenance efforts be continued indefinitely (102). Dietary and physical activity modifications need to be integrated and accepted as a way of life.

Unfortunately, we have limited knowledge of what behaviors are necessary for successful maintenance. The National Weight Control Registry involves individuals who have lost at least 30 pounds and sustained the loss for a least a year; the typical registrant has, in fact, lost more than that minimum and sustained the loss for more than five years. The successful maintainers in the Registry report very careful attention to a reduced calorie, low-fat diet, increased levels of physical activity, and frequent weighing (5-7). It is not established that these behaviors represent what is minimally necessary for weight loss maintenance; however, these proposed lifestyle modifications on an ongoing basis have produced long-term weight loss maintenance.

Experts in the prevention of relapse have developed models to explain the environmental, emotional, and behavioral aspects of relapse (103). Unfortunately, these models do not address the biological factors impacting metabolic rate and

hunger and satiety, thereby contributing to weight regain. Improvements in weight loss maintenance are shown when the risks of relapse are addressed as part of the intervention. Even with extended contacts and relapse prevention education, the reported programs are not able to produce maintenance of all losses in all participants (104). It is difficult to sustain the commitment and participation in long-term treatment programs or with follow-up programs (105), but this is what has been shown to be effective.

Dietitians, because of their close work with patients and clients, are ideally placed to exert leadership in combating weight management relapse. In every patient interaction, they should emphasize the goal of long-term change. Dietitians may help their patients come to view dealing with their weight as a multi-stage process. Regain should not be framed as a personal failure but rather as an indication of a need for another phase of active management. Not all patients will be able to maintain the behaviors that are necessary to sustain losses. Dietitians can anticipate this reality and help their patients to salvage some benefits from their efforts.

Dietitians should address the problems by collecting data initiating alternative strategies and using other resources in the community. An ongoing problem continues to be the cost of providing expanded and extended programs. Currently there is no funding for long-term maintenance services. We must find creative new ways to exert our influences. These might be online programs, phone contacts, utilization of lay leadership, and others.

Cost of Weight Management

Although ideally a long-term, multidisciplinary program is more effective than a short-term program (106), ideal programs are expensive to run. Multifaceted programs can better address the complexity of issues related to achievement of goals; these programs require the services of several health care professionals, increasing the financial cost and time commitment from patients. In addition, access to exercise facilities and/or equipment and purchasing more appropriate food may add to the overall expense. All approaches to weight management, including pharmaceutical and surgical interventions, ultimately require a comprehensive lifestyle program that focuses on nutrition, exercise, cognitive behavioral changes and medical monitoring to increase the likelihood of long-term success and healthy outcomes.

However, there currently exist barriers to implementing lifestyle programs of maximum effectiveness. Even though health care costs are acknowledged, and NHLBI and the International Classification of Diseases list obesity as a disease, many other organizations do not consider it a disease for reimbursement purposes (9,107). For example, third party reimbursement is not universal and rare for programs to modify weight status; reimbursement when it is provided is frequently limited in duration. Since the prevalence of obesity is rapidly increasing and becoming a major public health concern, it is imperative that private and public sectors work together to obtain third party reimbursement to support treatment for changes in weight status for obesity treatment as well as funding for further research. Obesity must be acknowledged as a disease for reimbursement purposes since data clearly support its association with increased morbidity and mortality (108). Until such data is accepted by both third party payers and the medical community, the obesity epidemic will not be effectively controlled, and a significant barrier will be main-

tained. Also, there is limited understanding among both lay and health care professionals of the complexity and difficulty of the need for intensive and extensive weight management support.

Cost-containment strategies that may improve efficiency may also compromise outcome. These strategies include: triage or stepped approaches; limitations of treatment length and/or frequency of sessions; use of groups; and/or coordination with self-help, lay-led, and for-profit resources.

RESPONSIBILITIES OF DIETITIANS IN WEIGHT MANAGEMENT

Dietetic practice in weight management is complex and challenging; specialized training is desirable. It is important to focus upon long-term as well as short-term outcomes while respecting the patient's goals and values. Since many patients are looking for fast and large weight losses, it is important to convey realistic expectations. Tracking treatment outcomes and sharing these with patients, help to clarify expectations at the outset. It is also important for dietitians to maintain currency in their own professional development; including continuing education and training and, if feasible, obtaining specialized supervision when needed. Dietetic professionals need to stay within appropriate scope of practice; they must know their limitations and respect them; making referrals as needed.

Role of the Dietetics Professional in a Team Approach to Weight Management

The physician is usually the first member of the health care team to see patients in need of weight management. It is essential that physicians use this contact effectively, reflecting the complexity of the challenge and making referral to other health care professionals to activate successful intervention. The dietitian has primary responsibility for assessment and recommendations related to food behavior. Given the relationship of physical activity to energy expenditure and weight maintenance, the dietitian may also be involved in assessment and recommendation of activity, provided the patient is cleared for exercise by his or her medical doctor. For example, Byfield was able to show significant and sustained improvements in energy expenditure and cardiorespiratory fitness in heavy women who participated in a program designed to address barriers to exercise and encourage daily physical activity (109).

It may also fall on the dietitian to be the provider who can interpret the results from the initial assessment and make appropriate, patient-matched treatment recommendations.

The dietitian should be attentive to the patient's concerns, being aware of feelings, values, behaviors, and worries beyond food behaviors and assume an active role in communicating these to the other care providers.

Dietitians are the primary nutrition practice professionals and, as such, have a responsibility for exerting leadership for reducing the prevalence of obesity. Clearly prevention is a complex matter requiring the cooperation of private and public sectors. Currently there is no clear path of action to prevent excessive body weight, which increases health risks. Research has identified certain groups at particular risk; evidently interventions have to start with very young children (26,110).

Dietitians can contribute to the prevention of obesity, not only in their own practice but also by pointing out the seriousness of the increasing weight of the entire population. Dietitians must advocate public policies to support increased opportunities for healthy eating, exercise, and research into

improved strategies for intervention and prevention. As professionals with daily close contact with individuals struggling with weight management, dietitians need to remind policy makers of the difficulty and complexity of the situation. They must resist efforts to further stigmatize obesity, pointing out the lack of evidence of any benefit of this approach, as well as the danger of increasing the risk of eating disorders. It has been suggested that successful weight management is in need of fresh ideas (93); dietitians with their broad educational preparation and intense patient contact may be a rich source of such ideas.

Knowledge and Skills Required

A thorough knowledge of weight management and appreciation of its complexity is imperative. The dietitian will benefit from a working knowledge of theories of behavior change and how to build upon these in designing interventions. Weight management requires the dietitian to have specialized assessment and screening skills in order to make appropriate treatment recommendations. When providing counseling it is important to involve the patient as an active partner. In addition to nutrition education and guidance, nutrition counseling strategies include cognitive-behavioral interventions (111,112). These interventions often involve the ability to assist patients in finding resources within themselves and their community so as to continue behaviors independent of continued intervention by health care professionals.

CONCLUSION

Achieving and maintaining healthy lifestyle behaviors including activity and food intake can help weight management by helping to prevent weight gain. Prevention of weight gain and achieving modest amounts of weight loss can improve overall health.

In today's society, the environment is conducive to less activity than previous decades, more food availability in larger quantities, and higher caloric density. Therefore, concentrating on factors to limit the environmental influences is critical. It is important to acknowledge those factors we can change and those we cannot. It is also important that dietitians and other health care providers be in the forefront of lobbying for public health policy, third party reimbursement for treatment and management, and adequate community resources to address weight status and weight-related illness. We need to document our outcomes, develop flexible and individualized goals for patients, and continue to support research efforts to improve the efficacy of treatment. Such documentation requires thorough assessments and follow-up: medically, nutritionally, behaviorally, and psychologically. Based on current available treatment approaches, goals need to stay focused on a "healthy lifestyle" targeting the environmental factors that allow for gene expression, particularly physical activity and food choices directed toward less calorically dense foods.

We must educate ourselves and the medical community as to the physical and psychological impact of our recommendations. We must include our patients in the decision making process and inform them of the known positive outcomes they can achieve.

References

1. U.S. Department of Health and Human Services, Center for Disease Control and Prevention; National Center for Health Statistics, Maryland. Prevalence of Overweight and Obesity Among Adults: United States, 1999.
2. Wolf AM, Colditz GA. Current estimates of the economic cost of obesity in the United States. *Obes Res.* 1998;6:97-106.
3. Allison DB, Fontaine KR, Manson JE, Stevens J, VanItallie TB. Annual deaths attributable to obesity in the United States. *JAMA.* 1999;282:1530-1538.
4. National Institute of Health, National Heart, Lung, and Blood Institute. Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults—the evidence report. *Obes Res.* 1998;6 (suppl 2):121S-122.
5. Anderson JW, Kontz EC, Frederick RC, Wood CL. Long-term weight-loss maintenance: a meta-analysis of US Studies. *Am J Clin Nutr.* 2001; 74:579-584.
6. Schick SM, Wing RR, Klem ML, McGuire T, et al. Persons successful at long-term weight loss and maintenance continue to consume a low energy, low fat diet. *JADA.* 1998;98:408-413.
7. Wing RR, Hill JO. Successful weight loss maintenance. *Ann Rev Nutr.* 2001;21:323-341.
8. Kassirer JP, Angell M. Losing weight—An ill-fated New Year's Resolution. *N Engl J Med.* 1998;338:52-54.
9. National Institutes of Health and National Heart, Lung and Blood Institute. Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults—The Evidence Report. *Obes Res.* 1998;xi
10. Leibel R, Rosenbaum M, Hirsch J. Changes in Energy Expenditure Resulting from Altered Body Weight. *N Engl J Med.* 1995;332(10):621-628.
11. Schwartz MW, Woods SC, Porte D, Seeley RJ, Baskin DG. Central nervous system control of food intake. *Nature.* 2000;404:661-671.
12. Bray GA, York DA. Clinical review 90: Leptin and clinical medicine: a new piece in the puzzle of obesity. *J Clin Endocrinol Metab.* 1997;82:2771-2776.
13. Erlanson-Albertsson C, York D. Enterostatin—a peptide regulating fat intake. *Obes Res.* 1997;5:360-372.
14. Barsh G, Farooqi I, O'Rahilly S. Genetics of body weight regulation. *Nature* 2000, 404:644-651.
15. Perusse L, Chagnon YC, Weisnagel SJ, Rankinen T, Snyder E, Sands J, Bouchard C. The human obesity gene map: The 2000 Update. *Obes Res.* 2001;9:8135-169.
16. Maes HH, Neale MC, Eaves IJ. Genetics and environmental factors in relative body weight and human adiposity. *Behav Genet.* 1997;27:325-35.
17. Stunkard AJ, Sorensen TIA, Hanis C, Teasdale TW, Chakraborty R, Schull WJ, Schulsinger F. An adoption study of human obesity. *N Engl J Med.* 1986;314:193-198.
18. Stunkard AJ, Harris JR, Pedersen NL, McClearn GE. The body mass index of twins who have been reared apart. *N Engl J Med.* 1990;322:1483-1487.
19. Bouchard C, Trembley A, Despres JP, et al. The response of long-term overfeeding in identical twins. *N Engl J Med.* 1990;322:1477-1482.
20. Zhang YY, Proenca R, Marfeil M, et al. Positional cloning of the mouse obese gene and its human homologue. *Nature.* 1994;372:425-432.
21. Montague CT, Farooqi IS, Whitehead JP, et al. Congenital leptin deficiency is associated with severe early onset obesity in humans. *Nature.* 1997;387:903-908.
22. Friedman JM, Halaas JL. Leptin and the regulation of body weight in mammals. *Nature.* 1998;395:763-770.
23. Ravussin E, Bogardus C. Relationship of genetics, age, and physical fitness to daily energy expenditure and fuel utilization. *Amer J Clin Nutr.* 1989;49:968-75.
24. Bradford BL, Spiegelman BM. Towards a molecular understanding of adaptive thermogenesis. *Nature.* 2000;404:652-660.
25. Bray GA. *Contemporary Diagnosis and Management of Obesity.* Health Care Co: Newtown, PA; 1998: 35-67.
26. Mokdad AH, Serdula MK, Dietz WH, Bowman BA, Marks JS, Koplan JP. The spread of the obesity epidemic in the United States, 1991-1998. *JAMA.* 1999;282:1519-1522.
27. Casas YG, Schiller BC, DeSouza CA, Seals DR. Total and regional composition across age in healthy Hispanic and white women of similar socioeconomic status. *Am J Clin Nutr.* 2001;73:13-18.
28. Jakicic JM, Wing RR. Differences in resting energy expenditure in African Americans vs Caucasian overweight females. *Int J Obes Relat Metab Disord.* 1998;22:236-42.
29. Hill JO, Peters JC. Environmental contributions to the obesity epidemic. *Science.* 1998;280:1371-1374.
30. Young LR, Nestle M. The contribution of expanding portion sizes to the US obesity epidemic. *Am J Public Health.* 2002;92:246-249
31. Devlin MJ, Yanovski SZ, Wilson GT. Obesity: What mental health professionals need to know. *Am J Psychiatry.* 2000;157:854-866

32. Stahl SM. How to appease the appetite of psychotropic drugs. *J Clin Psychiatry*. 1998;59:500-501.
33. Ackerman S, Nolan LJ. Body weight gain induced by psychotropic drugs: incidence, mechanism, and management. *CNS Drugs*. 1998;9:135-151.
34. DiPietro L, Anda RF, Williamson DF, Stunkard AJ. Depressive symptoms and weight change in a national cohort of adults. *Int J Obes*. 1992;16:745-753.
35. Stunkard AJ, Fernstrom MH, Frank E, Kupfer DJ. Direction of weight change in recurrent depression: consistency across episodes. *Arch Gen Psychiatr*. 1990;47:857-860.
36. Wurtman RJ, Wurtman JJ. Serotonergic mechanisms and obesity. *J Nutr Biochem*. 1998;9:511-515.
37. National Institutes of Health and National Heart, Lung and Blood Institute. Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults—The Evidence Report. *Obes Res*. 1998;6(Suppl 2):108S-109S.
38. Willett WC, Dietz WH, Colditz GA. Primary Care: Guidelines for healthy weight. *N Engl J Med*. 1999;341:427-434.
39. Kuczmarski RJ, Flegal KM. Criteria for definition of overweight in transition: background and recommendations for the United States. *Am J Clin Nutr*. 2000;72(5):1074-1081.
40. Flegal KM, Troiano RP, Ballard-Barbash R. Aim for a healthy weight: What is the target. *J Nutr*. 2001;131:440S-450S.
41. Bray, GA. Clinical Evaluation and Introduction to Treatment of Overweight. *Contemporary Diagnosis and Management of Obesity*. Handbooks in Health Care Co: Newtown, PA; 1998: 140-145.
42. National Institutes of Health and National Heart, Lung and Blood Institute. Clinical Guidelines on the Identification, Evaluation and Treatment of Overweight and Obesity in Adults—The Evidence Report. *Obes Res*. 1998; 6(suppl 2):54S.
43. World Health Organization. *Obesity: Preventing and Managing the Global Epidemic*. Report of a WHO Consultation on Obesity, Geneva, June 1997. 1998, pp 43-72.
44. Cummings S, Pratt J, Kaplan L. Evaluation and Management of Obesity. In: Carlson K, Eisenstat, S, eds. *Primary Care of Women*. 2nd ed. Mosby Yearbook: New York, NY; 2002.
45. Yanovski SZ, Nelson JE, Dubbert BK, Spitzer RI. Association of binge eating disorder and psychiatric comorbidity in obese subjects. *Am J Psychiatry*. 1993;150:1472-1479.
46. Molinari E, Ragazzoni P, Morosin A. Psychopathology in obese subjects with and without binge-eating disorder and in bulimic subjects. *Psychol Rep*. 1997;80:1327-1335.
47. National Institutes of Health and National Heart, Lung and Blood Institute. Clinical Guidelines on the Identification, evaluation and treatment of Overweight and Obesity in Adults—The Evidence Report. Obesity Research, 1998;6(suppl 2):110S.
48. Bertram SR, Venter I, Stewart RI. Weight loss in obese women—exercise vs. dietary education. *S Afr Med J*. 1990;78:15-18.
49. Gordon NF, Scott CB, Levine BD. Comparison on single versus multiple lifestyle interventions: are the antihypertensive effects of exercise training and diet-induced weight loss additive? *Am J Cardiol*. 1997;79:763-767.
50. Stefanick ML, Mackey S, Sheehan M, Ellsworth N, Haskell WL, Wood PD. Effects of the NCEP Step 2 diet and exercise on lipoprotein in postmenopausal women and men with low HDL-cholesterol and high LDL-cholesterol. *N Engl J Med*. 1998;329:12-20.
51. Grommet J. Weight management: Framework for changing behavior. In: Dalton S, ed. *Overweight and Weight Management*. Gaithersburg, MD: Aspen; 1997: 332-347.
52. Van Gaal LF. Dietary treatment of obesity. In: Bray GA, Bouchard C, James WPT, eds. *Handbook of Obesity*. NY: Marcel Dekker; 1998: 875-890.
53. McFarlane T, Polivy J, McCabe RE. Help, not harm: Psychological foundation for a nondieting approach toward health. *J Social Issues*. 1999;55:261-276.
54. National Institutes of Health and National Heart, Lung and Blood Institute. Clinical Guidelines on the Identification, Evaluation and Treatment of Overweight and Obesity in Adults—The Evidence Report. *Obes Res*. 1998;6(suppl 2):110S.
55. Foster GD, Wadden TA, Vogt RA., Brewer G. What is a reasonable weight loss? Patients' expectations and evaluations of obesity treatment outcome. *J Consult Clin Psychol*. 1998;65:79-85.
56. Allison D. *A Handbook of Assessment Methods for Eating Behaviors and Weight-related Problem: Measures Theory and Research*. Thousand Oaks CA: Sage; 1995.
57. St Jeor ST, ed. *Obesity Assessment: Tools, Methods and Interpretations*. NY: Chapman & Hall. 1997.
58. Parham ES. Promoting body size acceptance in weight management counseling. *JADA*. 1999;99:920-925.
59. Strain GW. Response to promoting size acceptance to weight management counseling. *JADA*. 1999;99:926-928.
60. Lyons P, Miller WC. Effective healthcare for large people. *Healthy Weight J*. 2000;14:71-73.
61. Berg F. *Women Afraid to Eat: Breaking Free in Today's Weight Obsessed World*. Hettinger ND: Healthy Weight Network; 2000:265-282.
62. Kant AK. Consumption of energy-dense, nutrient-poor foods by adult Americans: nutritional and health implications. The third National Health and Nutrition Examination Survey, 1988-1994. *Am J Clin Nutr*. 2000;72:929-936.
63. National Task Force on the Prevention and Treatment of Obesity, National Institutes of Health. Very low-calorie diets. *JAMA*. 1993;270:967-974.
64. Wadden TA. Treatment of obesity by moderate and severe caloric restriction: results of clinical research trials. *Ann Intern Med*. 1993;119:688-93.
65. NIH Technology Assessment Conference Panel. 1993. Methods for voluntary weight loss and control: Technology Assessment Conference Statement. *Ann Intern Med* 119:764-770.
66. Bray G. *Contemporary Diagnosis and Management of Obesity*. Newtown, Pa: Handbooks in Health Care Co; 1998: 192-202.
67. Wadden TA, Foster GD, Letizia KA. One-year behavioral treatment of obesity: comparison of moderate and severe caloric restriction and the effects on weight maintenance therapy. *J Consult Clin Psychol*. 1994;62:165-171.
68. Stein K. High-protein, low carbohydrate diets: Do they work? *JADA*. 2000;100:760-761.
69. United States Dept of Agriculture. *Dietary Guidelines for Americans*, 2000. 5th ed. 2000 Home and Garden Bulletin 232; 28-31.
70. National Institutes of Health and National Heart, Lung and Blood Institute. Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults—The Evidence Report. 1998;6(Suppl 2):114S.
71. Flechtner-Mors M, Ditschuneit HH, Johnson TD, Suchard MA, Adler G. Metabolic and weight loss effects of long-term dietary intervention in obese patients: Four year results. *Obes Res*. 2000;8:399-402.
72. Wadden TA, Frey DL. A multicenter evaluation of a proprietary weight loss program for the treatment of obesity: A five-year follow-up. *Int J Eat Disord*. 1997;22:203-212.
73. Freedman MR, King J, Kennedy. Popular diets: a scientific review. *Obes Res*. 2001;9(Suppl 1):1S-40S.
74. Rippe JM, Hess St. The role of physical activity in the prevention and management of obesity. *J Am Diet Assoc*. 1998;98 (Suppl 2):S31-S38.
75. McInnis KY. Exercise and obesity. *Coron Artery Dis*. 2000;11:111-116.
76. Pavlou KN, Krey S, Steffee WO. Exercise as an adjunct to weight loss and maintenance in moderately obese subjects. *Am J Clin Nutr*. 1989;49:1115-1123.
77. Schulz LO, Schoeller DA. A compilation of total daily energy expenditures and body weights in healthy adults. *Am J Clin Nutr*. 1994;60:676-681.
78. Ballor DL, Katch VL, Becque MD, Marks CR. Resistance weight training during caloric restriction enhances lean body weight maintenance. *Am J Clin Nutr*. 1988;319:1173-1179.
79. Porcari J, Ward A, Morris D, Maher M, Cuneo P, O'Hanley S, Rippe J. Comparison of weight loss in males and females after 16 weeks of fitness walking and/or diet [abstract]. *Med Sci Sports Exerc*. 1986;21:S102.
80. Ross R, Dagnone D, Jones P, Smith H, Paddags A, Hudson R, Janssen I. Reduction in obesity and related comorbid conditions after diet-induced weight loss or exercise-induced weight loss in men. *Ann Intern Med*. 2000;133:92-103.
81. Mourier A, Gautier JF, De Kerviler E, Bigard AX, Villette JM, Garnier JP, Duvallet A, Guezennec CY, Cathelineau G. Mobilization of visceral adipose tissue related to the improvement in insulin sensitivity in response to physical training in NIDDM. Effects of branched-chain amino acid supplements. *Diabetes Care*. 1997;20:385-391.
82. Wing RR, Matthews KA, Kuller LH, Meilahn EN, Plantinga P. Waist to hip ratio in middle-aged women. Associations with behavioral and psychosocial factors and with changes in cardiovascular risk factors. *Arterioscler Thromb Vasc Biol*. 1991;11:1250-1257.
83. Blair SN, Kampert JB, Kohn HW 3rd, Barlow CE, Macera CA, Paffenbarger RS Jr, Gibbon LW. Influences of cardiorespiratory fitness and other precursors on cardiovascular disease and all-cause mortality in men and women. *JAMA*. 1996;276:205-210.
84. Bartlow CE, Kohl HW, Gibbons LW, Clair SF. Physical fitness, mortality, and obesity. *Int J Obesity*. 1995;19 (Suppl):S41-S44.
85. Wood P, Stefanick M, Dreon D, Frey-Hewitt B, Garay SC, Williams PT, Superko HR, Fortmann SP, Albers JJ, Branizan KM, Willworth NM, Terry RB, Haskell WL. Changes in plasma lipids and lipoproteins in overweight men during weight loss through dieting as compared with exercise. *N Engl J Med*. 1988;319:1173-1179.
86. Yanovski S, Yanovski JA. Drug Therapy: Obesity. *N Engl J Med*. 2002; 346:591-602.
87. NIH and NAASO. *The Practical Guide: Identification, Evaluation, and Treatment of Overweight and Obesity in Adults*. NIH Publication Number 00-4084, 2000: 35-38.

88. Stein, K. Herbal supplements and prescription drugs. *JADA*. 2000;100:4.

89. Nortier JL, Martinez M-CM, Schmeiser HH, Arlt VM, Bieler CA, Petein M, Depierreux MF, DePauw L, Abramowicz D, Vereerstraeten P, Vanherweghem J-L. Urothelial carcinoma associated with the use of a Chinese herb (Aristolochia Fangchi). *N Engl J Med*. 2000;342:1686-92.

90. Kernan WN, Viscoli CM, Brass LM, Broderick JP, Brott T, Feldman E, Morgenstern LB, Willetink JL, Horwitz RJ. Phenylpropanolamine and risk of hemorrhagic stroke. *N Engl J Med*. 2000;343:1686-92.

91. Haller CA, Benowitz NL. Adverse cardiovascular and central nervous system events associated with dietary supplements containing ephedra alkaloids. *N Engl J Med*. 2000;343:1833-8.

92. National Institutes of Health and National Heart, Lung, and Blood Institute. Clinical Guidelines on the Identification, Evaluation and Treatment of Overweight and Obesity—The Evidence Report. *Obes Res*. 1998;6(Suppl 2):120S.

93. Campbell LA, Smith FJ, Burn P. Strategies and potential molecular targets for obesity treatment. *Science*. 1998;1383-1387.

94. Heymsfield SB, Greenberg AS, Fujioka K, Dixon RM, Kushner R, Hunt T, Lubina JA, Patane J, Hunt P, McCamish M. Recombinant leptin for weight loss in obese and lean adults. A randomized, controlled, dose-escalation trial. *JAMA*. 1999;282:1568-1575.

95. MacLean LD, Rhode BM, Nohr CW. Late outcome of isolated gastric bypass. *Ann of Surg*. 2000. 231:524-528.

96. Marceau P, Hould FS, Simard S et al. Biliopancreatic diversion with duodenal switch. *World J Surg*. 1998;22:947-954.

97. MacLean LD, Rhode BM. Does genetic predisposition influence surgical results of operations for obesity? *Obes Surgery*. 1996;6:132-137.

98. Kellum JM, DeMaria EJ, Sugarman HJ. The surgical treatment of morbid obesity. *Curr Prob Surg*. 1998;35:791-858.

99. Sumall AJ. A review of liposuction as a cosmetic surgical procedure. *J Nat Med Assn*. 1987;79:1275-1279.

100. Miller WC. How effective are traditional dietary and exercise interventions for weight loss? *Med Sci Sports Exerc*. 1999;31:1129-1131.

101. National Institute of Health, National Heart, Lung, and Blood Institute. Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults—the evidence report. *Obes Res*. 1998;6(Suppl 2):111S.

102. National Institute of Health, National Heart, Lung, and Blood Institute. Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults—the evidence report. *Obes Res*. 1998;6(Suppl 2):127S.

103. Marlatt GA, Gordon JR. *Relapse Prevention: Maintenance Strategies in Addictive Behavior Change*. NY: Guilford Press; 1985.

104. Wing RR. Behavioral approaches to the treatment of obesity. In: Bray GA, Bouchard C, James WPT, eds. *Handbook of Obesity*. New York, NY: Marcel Dekker; 1998: 855-874.

105. Wadden TA. The management of obesity: From past failure to future attainment. In: Guy-Grand B, Ailhaud G, eds. *Progress in Obesity Research: 8*. London: John Libbey & Co; 1999: 713-719.

106. Jeffery RW, Drewnowski A, Epstein LH, Stunkard AJ, Wilson GT, Wing RR, Hill DR. Long-term maintenance of weight loss: current status. *Health Psychology*. 2000;1(Suppl):5-16.

107. *International Classification of Diseases*. 9th Rev. ICD-9-CM. Chicago, IL: American Medical Association; 2000.

108. National Institutes of Health and National Heart, Lung and Blood Institute. Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults—The Evidence Report. *Obes Res*. 1998;xii

109. Byfield C. *A lifestyle physical activity intervention for obese sedentary women: Effect on cardiovascular disease risk factors*. American College of Sports Med: Indianapolis IN; 2000.

110. Helm KK, Klawiller B. *Nutrition Therapy: Advanced counseling Skills*. Lake Dallas, Texas: Helm Seminars; 1995: 135-161.

111. Beck JS. *Cognitive Therapy: Basics and Beyond*. New York, NY: Guilford Press; 1995.

112. Rosen JC. Improving body image in obesity. In: Thompson, JK, ed. *Body Image, Eating Disorders and Obesity*. Washington, DC: American Psychological Association; 1996: 425-550.

ADA Position adopted by the House of Delegates October 20, 1996, and reaffirmed on September 12, 1999. This position is in effect until December 31, 2005. The American Dietetic Association authorizes republication of the position paper, *in its entirety*, provided full and proper credit is given. Requests to use portions of the position must be directed to ADA Headquarters at 800/877-1600, ext 4835 or ppapers@eatright.org.

Recognition is given to the following for their contributions:

Authors:

Sue Cummings, MS, RD (Massachusetts General Hospital Weight Center, Boston, MA); Ellen S. Parham, PhD, RD (Northern Illinois University, DeKalb, IL); Gladys W. Strain, PhD, RD (Mt. Sinai School of Medicine, New York, NY)

Reviewers:

Gaston P. Bathalon, PhD, RD, FADA (US Army, Natick, MA); Ann M. Coulston, MS, RD, FADA (nutrition consultant, Woodside, CA); Sharron Dalton, PhD, RD (New York University, New York, NY); Dayle Hayes, MS, RD (nutrition consultant, Billings, MT); Joanne P. Ikeda, MA, RD (University of California, Berkeley, CA); Melinda Manore, PhD, RD (Oregon State University, Corvallis, OR)

Members of the Association Positions Committee Workgroup:

Barbara Baron, MS, RD (Chair); Mary Marian, MS, RD; Lillie Williams, PhD, RD, FADA; James O. Hill, PhD (content advisor)