Obesity

Goals & Objectives

Course Description
"Obesity" is an online continuing education course for physical therapists and physical therapist assistants. This course presents updated information about obesity including sections on contributing factors, mortality, health risks, assessment, management, and prevention.

Course Rationale
The purpose of this course is to present current information about obesity. Both therapists and assistants will find this information pertinent and useful when creating and implementing rehabilitation programs that address the challenges and needs specific to individuals who are overweight or obese.

Course Goals and Objectives
Upon completion of this course, the therapist or assistant will be able to:
1. recognize environmental, genetic, and psychological factors that contribute to obesity
2. identify the health risks associated with obesity
3. identify BMI and other assessment criteria used to determine obesity
4. recognize the factors used to determine relative and absolute risk
5. recognize the components utilized to perform a behavioral assessment
6. recognize the various treatment guideline incorporated into the treatment of obesity
7. identify and differentiate the key components of each of the following weight loss therapies: dietary, physical activity, behavioral, and pharmacological
8. differentiate between the various weight loss surgeries

Course provider – Innovative Educational Services
Course Instructor - Michael Niss, DPT
Target Audience - Physical therapists and physical therapist assistants
Course Educational Level - This course is applicable for introductory learners.
Course Prerequisites - None
Criteria for Issuance of CE Credits - A score of 70% or greater on the course post-test.
Method of Instruction/Availability – Online text-based course available continuously.
Continuing Education Credits - Four (4) hours of continuing education credit
Course Outline

Course Goals and Objectives

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- Economic Impact
- Obesity Trends

Contributing Factors
- Environmental Factors
- Genetic Factors
- Psychological Factors

Psychosocial Aspects of Obesity

Mortality
- Mortality and Obesity
- Mortality and Obesity in Geriatrics
- Mortality and Obesity in Ethnic Minorities

Health Risks of Obesity
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- Type 2 Diabetes
- Coronary Heart Disease
- Congestive Heart Failure
- Cerebrovascular Disease
- Gallstones
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- Sleep Apnea
- Colon Cancer
- Breast Cancer
- Endometrial Cancer
- Women’s Reproductive Health

Assessment of Overweight and Obesity
- Body Mass Index (BMI)
- Waist Circumference

Assessment of Risk Status
- Determination of Relative Risk Status
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Management of Obesity
- Treatment Guidelines
- Rate of Weight Loss
- Weight Maintenance

Weight Management Therapies
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- Physical Activity
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Prevention of Overweight and Obesity

Providing Optimal Care to Overweight Patients

Resources

Appendix A: BMI Table

References

Post-test
Introduction

Obesity is a complex, multi-factorial disease that develops from the interaction between genotype and the environment. Our understanding of how and why obesity occurs is incomplete; however, it involves the integration of social, behavioral, cultural, physiological, metabolic, and genetic factors.

Today, health care practitioners are encouraged to play a greater role in the management of obesity. Therapists who are familiar with the various elements of bariatric care can more successfully fulfill the critical role of helping the patient improve health by identifying the problem and coordinating other resources within the community to assist the patient.

Effective management of overweight and obesity can be delivered by a variety of health care professionals with diverse skills working as a team. For example, coordinated involvement is needed for the initial assessment of risk and the application of appropriate treatment programs that may include pharmacotherapy, surgery, exercise, and the medical management of the comorbidities of obesity. A positive, supportive attitude and encouragement from all professionals are crucial to the continuing success of the patient.

An estimated 97 million adults in the United States are overweight or obese. These conditions substantially increase the risk of morbidity from hypertension, dyslipidemia, type 2 diabetes, coronary artery disease, stroke, gallbladder disease, osteoarthritis, and sleep apnea and respiratory problems, as well as cancers of the endometrium, breast, prostate, and colon. Higher body weights are also associated with an increase in mortality from all causes. Obese individuals may also suffer from social stigmatization and discrimination. As a major cause of preventable death in the United States today, overweight and obesity pose a major public health challenge.

Overweight is defined as a body mass index (BMI) of 25 to 29.9 kg/m², and obesity is defined as a BMI =30 kg/m² or greater. However, overweight and obesity are not mutually exclusive, since obese persons are also overweight. A BMI of 30 indicates an individual is about 30 pounds overweight; it may be exemplified by a 221-pound person who is 6 feet tall or a 186-pound individual who is 5 feet 6 inches tall. The number of overweight and obese men and women has risen since 1960. Currently, the percentage of adults in the U.S., ages 20 years or older, who are classified as overweight or obese has increased to 54.9 percent. Overweight and obesity are especially evident in some minority groups, as well as in those with lower incomes and less education.

Economic Impact

Overweight and obesity and their associated health problems have a significant economic impact on the U.S. health care system. Medical costs associated with
overweight and obesity may involve direct and indirect costs. Direct medical costs may include preventive, diagnostic, and treatment services related to obesity. Indirect costs relate to morbidity and mortality costs. According to a study of national costs attributed to both overweight (BMI 25–29.9) and obesity (BMI greater than 30), medical expenses account for approximately 9.1 percent of total U.S. medical expenditures and may be as high as $93 billion. Approximately half of these costs are paid by Medicaid and Medicare.

**Obesity Trends**

Adult men and women are roughly an inch taller than they were in 1960, but are nearly 25 pounds heavier on average as well. In addition, average BMI has increased among adults from approximately 25 in 1960 to 28 in 2002. Meanwhile, the average weight for men aged 20-74 years rose dramatically from 166.3 pounds in 1960 to 191 pounds in 2002, while the average weight for women the same age increased from 140.2 pounds in 1960 to 164.3 pounds in 2002.

Though the average weight for men aged 20-39 years increased by nearly 20 pounds over the last four decades, the increase was greater among older men:

- Men between the ages of 40 and 49 are nearly 27 pounds heavier on average now compared with 1960.
- Men between the ages of 50 and 59 are nearly 28 pounds heavier on average now compared with 1960.
- Men between the ages of 60 and 74 are almost 33 pounds heavier on average now compared with 1960.

For women, the near opposite trend occurred:

- Women aged 20-29 are nearly 29 pounds heavier on average now compared with 1960.
- Women aged 40-49 are about 25½ pounds heavier on average now compared with 1960.
- Women aged 60-74 are about 17½ pounds heavier on average in now compared with 1960.

The average weights for children are increasing as well:

- The average weight for a 10-year-old boy in 1963 was 74.2 pounds; now it is nearly 85 pounds.
- The average weight for a 10-year-old girl in 1963 was 77.4 pounds; now it is nearly 88 pounds.
- A 15-year-old boy weighed 135.5 pounds on average in 1966; now the average weight of a boy that age is 150.3 pounds.
- A 15-year-old girl weighed 124.2 pounds on average in 1966; now the average weight for a girl that age is 134.4 pounds.
Average BMI for children and teens has also increased:
- In 1963, the average BMI for a 7-year-old boy was 15.9; now it is 17.0. For girls the same age, the average BMI increased from 15.8 to 16.6 over the same period.
- In 1966, the average BMI for a 16-year-old boy was 21.3; now it is 24.1. For girls the same age, the average BMI increased from 21.9 to 24.0 over the same period.

**Contributing Factors**

**Environmental Factors**

The environment is a major determinant of overweight and obesity. Environmental influences on overweight and obesity are primarily related to food intake and physical activity behaviors. In countries like the United States, there is an overall abundance of palatable, calorie-dense food. In addition, aggressive and sophisticated food marketing in the mass media, supermarkets, and restaurants, and the large portions of food served outside the home, promote high calorie consumption.

Many of our sociocultural traditions promote overeating and the preferential consumption of high-calorie foods. For many people, even when caloric intake is not above the recommended level, the number of calories expended in physical activity is insufficient to offset consumption. Mechanization limits the necessity of physical activity required to function in society. Many people are entrenched in sedentary daily routines consisting of sitting at work, sitting in traffic, and sitting in front of a television or a computer monitor for most of their waking hours. In this obesity-promoting environment, individual attitudes and behaviors are critical in weight management. Many individuals may need extended treatment in clinical or community settings to enable them to cope with the complexities of long-term weight management, especially if there is a history of unsuccessful attempts at self-treatment. When the typical daily routine is so strongly biased towards promoting and perpetuating overweight and obesity, very high levels of knowledge, motivation, personal behavioral management skill, and lifestyle flexibility are required for an overweight or obesity-prone individual to avoid becoming overweight, or progressing to moderate or severe obesity.

Although there are undoubtedly some inter- and intrapopulation variations in the genetic predisposition to become overweight or obese, several lines of evidence suggest that genetic factors alone cannot explain the demographic and ethnic variations in overweight and obesity prevalence. For example, there is a difference in obesity prevalence among low- and high-income white women in industrialized societies. Other studies of populations, including migration studies, have shown an increase in average body weight in those who move from a traditional to a Westernized environment. Culturally determined attitudes about
food, physical activity, and factors that vary with income, education, and occupation may increase the level of difficulty in weight management. Body image concerns and other motivations for avoiding obesity or controlling weight within given limits also vary with ethnic background, age, socioeconomic status, and gender. Thus, the competence of practitioners in working with diverse socio-cultural perspectives can be a critical factor in the success of obesity treatment.

**Genetic Factors**

Obesity is a complex multifactorial chronic disease developing from interactive influences of numerous factors—social, behavioral, physiological, metabolic, cellular, and molecular. Genetic influences are difficult to elucidate and identification of the genes is not easily achieved in familial or pedigree studies. Furthermore, whatever the influence the genotype has on the etiology of obesity, it is generally attenuated or exacerbated by non-genetic factors. A large number of twin, adoption, and family studies have explored the level of heritability of obesity; that is, the fraction of the population variation in a trait (e.g., BMI) that can be explained by genetic transmission. Recent studies of individuals with a wide range of BMIs, together with information obtained on their parents, siblings, and spouses, suggest that about 25 to 40 percent of the individual differences in body mass or body fat may depend on genetic factors. However, studies with identical twins reared apart suggest that the genetic contribution to BMI may be higher, i.e., about 70 percent. There are several other studies of monozygotic twins reared apart that yielded remarkably consistent results. The relative risk of obesity for first-degree relatives of overweight, moderately obese, or severely obese persons in comparison to the population prevalence of the condition reaches about 2 for overweight, 3 to 4 for moderate obesity, and 5 and more for more severe obesity.

Support for a role of specific genes in human obesity of body fat content has been obtained from studies of Mendelian disorders with obesity as one of the clinical features, single-gene rodent models, quantitative trait loci from crossbreeding experiments, association studies, and linkage studies. From the research currently available, several genes seem to have the capacity to cause obesity or to increase the likelihood of becoming obese. The rodent obesity gene for leptin, a natural appetite-suppressant hormone, has been cloned, as has been its receptor. In addition, other single gene mutants have been cloned. However, their relationship to human disease has not been established, except for one study describing two subjects with a leptin mutation. This suggests that for most cases of human obesity, susceptibility genotypes may result from variations of several genes.

Severely or morbidly obese persons are, on the average, about 10 to 12 BMI units heavier than their parents and siblings. Several studies have reported that a single major gene for high body mass was transmitted from the parents to their children. The trend implies that a major recessive gene, accounting for about 20
to 25 percent of the variance, is influenced by age and has a frequency of about 0.2 to 0.3. However, no genes have yet been identified. Evidence from several studies has shown that some persons are more susceptible to either weight gain or weight loss than others. It is important for the practitioner to recognize that the phenomenon of weight gain cannot always be attributed to lack of adherence to prescribed treatment regimens.

**Psychological Factors**

Research relating obesity to psychological disorders and emotional distress is based on community studies and clinical studies of patients seeking treatment. In general, community-based studies in the United States have not found significant differences in psychological status between the obese and non-obese. However, several recent European studies in general populations do suggest a relationship between obesity and emotional problems. Thus, it may be premature to state that there is no association between obesity and psychopathology or emotional distress in the general population. More focused, hypothesis-driven, and long-term studies are needed.

Overweight people seeking weight loss treatment may, in clinic settings, show emotional disturbances. In a review of dieting and depression, there was a high incidence of emotional illness symptoms in outpatients treated for obesity. However, several factors influenced these emotional responses; including childhood onset versus adult onset of obesity (those with childhood onset obesity appear more vulnerable). Another study that compared different eating disorder groups found that obese patients seeking treatment showed considerable psychopathology, most prominently mild to severe depression. Sixty-two percent of the obese group seeking treatment showed clinically significant elevations on the depression subscale of the Minnesota Multiphasic Personality Inventory, and 37 percent of this same group showed a score of 20 or higher (indicating clinical depression) on the Beck Depression Inventory. Focusing on depression was considered an important component of the weight loss program.

Another study compared obese people who had not sought treatment to an obese group that had sought treatment in a professional, hospital-based program, and to normal weight controls. Again, obese individuals seeking treatment reported more psychopathology and binge eating compared to the other groups. Both obese groups reported more symptoms of distress than did normal weight controls. The authors suggest that the obese population is not a homogenous group, and thus, may not respond in the same way to standardized treatment programs. In particular, obese individuals seeking treatment in clinic settings are more likely than obese individuals not seeking treatment and normal controls to report more psychopathology and binge eating.
Psychosocial Aspects of Obesity

Social Stigmatization

In American and other Westernized societies there are powerful messages that people, especially women, should be thin, and that to be fat is a sign of poor self-control. Negative attitudes about the obese have been reported in children and adults, in health care professionals, and in the overweight themselves. People's negative attitudes toward the obese often translate into discrimination in employment opportunities, college acceptance, less financial aid from their parents in paying for college, job earnings, rental availabilities, and opportunities for marriage.

Social stigma toward the obese has primarily been assessed among white individuals. There is some evidence that members of other racial and ethnic groups are less harsh in their evaluation of obese persons. One study assessed 213 Puerto Rican immigrants to the United States, and found a wide range of acceptable weights among them. Crandall found that Mexican students were significantly less concerned about their own weight and were more accepting of other obese people than were U.S. students. In addition, the degree of acceptance of obesity among people of lower education and income has not been well studied. Thus, these data are very incomplete with respect to racial and ethnic groups other than whites.

Mortality

In the majority of epidemiologic studies, mortality begins to increase with BMIs above 25 kg/m$^2$. The increase in mortality generally tends to be modest until a BMI of 30 kg/m$^2$ is reached. For persons with a BMI of 30 kg/m$^2$ or above, mortality rates from all causes, and especially from cardiovascular disease, are generally increased by 50 to 100 percent above that of persons with BMIs in the range of 20 to 25 kg/m$^2$. Three aspects of the association between obesity and mortality remain unresolved:

- Association of Body Mass Index with Mortality
- Association of Body Mass Index with Mortality in Older Adults
- Association of Body Mass Index with Mortality in Ethnic Minorities

Mortality and Obesity

Mortality rates are elevated in persons with low BMI (usually below 20) as well as in persons with high BMI. In some studies, adjustment for factors that potentially confound the relationship between BMI and mortality, such as smoking status and pre-existing illness, tends to reduce the upturn in mortality rate at low BMIs, but in a meta-analysis the higher mortality at low BMIs was not eliminated after adjustment for confounding factors. It is unclear whether the elevated mortality
observed at low BMIs is due to an artifact of incomplete control for confounding factors, inadequate body fat and/or inadequate body protein stores that result from unintentional weight loss, or individual genetic factors. Currently, there is no evidence that intentional weight gain in persons with low BMIs will lead to a reduction in mortality.

**Mortality and Obesity in Geriatrics**

Many of the observational epidemiologic studies suggest that the relationship between BMI and mortality weakens with increasing age, especially among persons aged 75 and above.

Several factors have been proposed to explain this observation. Older adults are more likely than younger adults to have diseases that both increase mortality and cause weight loss leading to lower body weight. In addition, as people age, they tend to have larger waist circumferences that increase their risk of mortality even at lower BMIs. Also, weight in middle age is positively related to risk of mortality in old age. The impact of smoking on body weight and mortality is likely to be much stronger in older adults because of the cumulative health effects of smoking.

BMI, which is an indirect estimate of adiposity, may underestimate adiposity in older adults whose BMI is similar to younger adults. It is also possible that persons most sensitive to the adverse health effects of obesity are more likely to have died before reaching older ages, resulting in older cohorts that are more "resistant" to the health effects of obesity. Recently, a 20-year prospective study of a nationally representative sample of U.S. adults aged 55 to 74 years suggested that lowest mortality occurs in the BMI range of 25 to 30. After adjusting for smoking status and pre-existing illness, lowest mortality occurred at a BMI of 24.5 in white men, 26.5 in white women, 27.0 in black men, and 29.8 in black women.

**Mortality and Obesity in Ethnic Minorities**

The levels of BMI associated with increased mortality are based on epidemiological studies of primarily white populations. The interest in confirming the association between BMI and mortality in other racial/ethnic groups stems partly from observations that lower-than-average total mortality has been observed among some populations with a high BMI level, and partly from observations that within certain populations there appears to be no effect of obesity at all or at the BMI levels that are associated with higher mortality in whites.

**African Americans**

Three small studies of narrowly defined populations of African Americans failed to show the expected association of BMI and mortality based on data from white
populations. Although the shape of the association of BMI and mortality in two large, representative U.S. data sets (the National Health and Nutrition Examination Follow-up Study and the National Health Interview Survey) is similar for black and white males and females, the BMI-related increase in risk begins at a 1 to 3 kg/m\(^2\) higher BMI level for blacks than for whites. For example, in the National Health and Nutrition Examination Follow-up Survey, the estimated BMI associated with minimum mortality was 27.1 for black men and 26.8 for black women, compared with 24.8 and 24.3, respectively, for white men and women. On the basis of these data, the use of the cutpoint of BMI > 30 kg/m\(^2\) for defining obesity is clearly applicable to African Americans as well as to whites.

Other Ethnic Minority Populations
Limited data relating obesity to mortality in American Indians were identified, but no data were found relating obesity to mortality in Hispanic Americans, Asian Americans, or Pacific Islanders. The lowest mortality rate among Pima men is observed at a BMI range of 35 to 40 kg/m\(^2\) for men, and no relationship between BMI and mortality is observed among Pima women (306). Based on mortality data alone, it would be hard to justify using the same standard for defining obesity in populations, such as American Indians, among whom the mean BMI is much higher than in the general U.S. population. However, diabetes-related morbidity among obese American Indians is extremely high, and the overall age-specific mortality among American Indians is generally higher than in the U.S. general population. Thus, obesity in American Indians is associated with a compromised overall survival of the population.

Although the data on mortality are still fragmentary for many minority populations, there are no studies that would support the exclusion of any racial/ethnic group from the current definitions of obesity.

Health Risks of Obesity

Hypertension

High blood pressure is defined as mean systolic blood pressure ≥140 mm Hg, or mean diastolic blood pressure ≥90 mm Hg, or currently taking anti-hypertensive medication. The prevalence of high blood pressure in adults with BMI ≥30 is 38.4 percent for men and 32.2 percent for women, respectively, compared with 18.2 percent for men and 16.5 percent for women with BMI < 25, a relative risk of 2.1 and 1.9 for men and women, respectively. The direct and independent association between blood pressure and BMI or weight has been shown in numerous cross-sectional studies, including the large international study of salt (INTERSALT) carried out in more than 10,000 men and women. INTERSALT reported that a 10 kg (22 lb) higher body weight is associated with 3.0 mm Hg higher systolic and 2.3 mm Hg higher diastolic blood pressure. These differences
in blood pressure translate into an estimated 12 percent increased risk for CHD and 24 percent increased risk for stroke.

**Type 2 Diabetes**

The increased risk of diabetes as weight increases has been shown by prospective studies in Norway, the United States, Sweden, and Israel. More recently, the Nurses’ Health Study, using data based on self-reported weights, found that the risk of developing type 2 diabetes increases as BMI increases from a BMI as low as 22. Since women in particular tend to under-report weight, the actual BMI values associated with these risks are likely to be higher than the Nurses’ Health Study data would suggest. An association between type 2 diabetes and increasing relative weight is also observed in populations at high risk for obesity and diabetes, such as in American Indians.

In recent studies, the development of type 2 diabetes has been found to be associated with weight gain after age 18 in both men and women. The relative risk of diabetes increases by approximately 25 percent for each additional unit of BMI over 22 kg/m². Additionally, in a prospective study representative of the U.S. population, it was recently estimated that 27 percent of new cases of diabetes were attributable to weight gain in adulthood of 5 kg (11 lb) or more. Both cross-sectional and longitudinal studies show that abdominal obesity is a major risk factor for type 2 diabetes.

**Coronary Heart Disease**

Observational studies have shown that overweight, obesity, and excess abdominal fat are directly related to cardiovascular risk factors, including high levels of total cholesterol, LDL-cholesterol, triglycerides, blood pressure, fibrinogen, and insulin, and low levels of HDL-cholesterol. Plasminogen activator inhibitor-1 causing impaired fibrinolytic activity is elevated in persons with abdominal obesity. Overweight, obesity, and abdominal fat are also associated with increased morbidity and mortality from CHD.

Recent studies have shown that the risks of nonfatal myocardial infarction and CHD death increase with increasing levels of BMI. Risks are lowest in men and women with BMIs of 22 or less and increase with even modest elevations of BMI. In the Nurses’ Health Study, which controlled for age, smoking, parental history of CHD, menopausal status, and hormone use, relative risks for CHD were twice as high at BMIs of 25 to 28.9, and more than three times as high at BMIs of 29 or greater, compared with BMIs of less than 21. Weight gains of 5 to 8 kg (11 to 17.6 lb) increased CHD risk (nonfatal myocardial infarction and CHD death) by 25 percent, and weight gains of 20 kg (44 lb) or more increased risk more than 2.5 times in comparison with women whose weight was stable within a range of 5 kg (11 lb). In British men, CHD incidence increased at BMIs above 22 and an
increase of 1 BMI unit was associated with a 10 percent increase in the rate of coronary events.

**Congestive Heart Failure**

Overweight and obesity have been identified as important and independent risk factors for congestive heart failure (CHF) in a number of studies, including the Framingham Heart Study. CHF is a frequent complication of severe obesity and a major cause of death; duration of the obesity is a strong predictor of CHF. Since hypertension and type 2 diabetes are positively associated with increasing weight, the coexistence of these conditions facilitates the development of CHF. Data from the Bogalusa Heart Study demonstrate that excess weight may lead to acquisition of left ventricular mass beyond that expected from normal growth. Obesity can result in alterations in cardiac structure and function even in the absence of systemic hypertension or underlying heart disease. Ventricular dilatation and eccentric hypertrophy may result from elevated total blood volume and high cardiac output. Diastolic dysfunction from eccentric hypertrophy and systolic dysfunction from excessive wall stress result in so-called "obesity cardiomyopathy". The sleep apnea/obesity hyperventilation syndrome occurs in 5 percent of severely obese individuals, and is potentially life-threatening. Extreme hypoxemia induced by obstructive sleep apnea syndrome may result in heart failure in the absence of cardiac dysfunction.

**Cerebrovascular Disease**

The relationship of cerebrovascular disease to obesity and overweight has not been as well studied as the relationship to CHD. A report from the Framingham Heart Study suggested that overweight might contribute to the risk of stroke, independent of the known association of hypertension and diabetes with stroke. More recently published reports are based on larger samples and delineate the importance of stroke subtypes in assessing these relationships. They also attempt to capture all stroke events, whether fatal or nonfatal. These studies suggest distinct risk factors for ischemic stroke as compared to hemorrhagic stroke, and found overweight to be associated with the former, but not the latter. This may explain why studies that use only fatal stroke outcomes (and thus overrepresent hemorrhagic strokes) show only weak relationships between overweight and stroke.

These recent prospective studies demonstrate that the risk of stroke shows a graded increase as BMI rises. For example, ischemic stroke risk is 75 percent higher in women with BMI > 27, and 137 percent higher in women with a BMI > 32, compared with women having a BMI < 21.
Gallstones

The risk of gallstones increases with adult weight. Risk of either gallstones or cholecystectomy is as high as 20 per 1,000 women per year when BMI is above 40, compared with 3 per 1,000 among women with BMI < 24.

According to NHANES III data, the prevalence of gallstone disease among women increased from 9.4 percent in the first quartile of BMI to 25.5 percent in the fourth quartile of BMI. Among men, the prevalence of gallstone disease increased from 4.6 percent in the first quartile of BMI to 10.8 percent in the fourth quartile of BMI.

Osteoarthritis

Individuals who are overweight or obese increase their risk for the development of osteoarthritis. The association between increased weight and the risk for development of knee osteoarthritis is stronger in women than in men. In a study of twin middle-aged women, it was estimated that for every kilogram increase of weight, the risk of developing osteoarthritis increases by 9 to 13 percent. The twins with knee osteoarthritis were generally 3 to 5 kg (6.6 to 11 lb) heavier than the co-twins with no disease. An increase in weight is significantly associated with increased pain in weight-bearing joints. There is no evidence that the development of osteoarthritis leads to the subsequent onset of obesity. A decrease in BMI of 2 units or more during a 10-year period decreased the odds for developing knee osteoarthritis by more than 50 percent; weight gain was associated with a slight increase in risk.

A randomized controlled trial of 6 months' duration examined the effect of weight loss on clinical improvement in patients with osteoarthritis. Patients taking phentermine had an average weight loss of 12.6 percent after 6 months while the control group had an average weight loss of 9.2 percent. There was improvement in pain-free range of motion and a decrease in analgesic use in association with weight loss; patients with knee disease showed a stronger association than those with hip disease. Similarly, improvement of joint pain was observed in individuals who had undergone gastric stapling, resulting in an average weight loss of 45 kg (99 lb).

Sleep Apnea

Obesity, particularly upper body obesity, is a risk factor for sleep apnea and has been shown to be related to its severity. The major pathophysiologic consequences of severe sleep apnea include arterial hypoxemia, recurrent arousals from sleep, increased sympathetic tone, pulmonary and systemic hypertension, and cardiac arrhythmias. Most people with sleep apnea have a BMI > 30. Large neck girth in both men and women who snore is highly predictive of sleep apnea. In general, men whose neck circumference is 17
Obesity

inches or greater and women whose neck circumference is 16 inches or greater are at higher risk for sleep apnea.

**Colon Cancer**

Many studies have found a positive relation between obesity and colon cancer in men but a weaker association in women. More recent data from the Nurses’ Health Study suggest that the relationship between obesity and colon cancer in women may be similar to that seen in men. Twice as many women with a BMI of > 29 kg/m² had distal colon cancer as women with a BMI < 21 kg/m². In men, the relationship between obesity and total colon cancer was weaker than that for distal colon cancer.

Other data from the Nurses’ Health Study show a substantially stronger relationship between waist-to-hip ratio and the prevalence of colon polyps on sigmoidoscopy, than with BMI alone. Even among leaner women, a high waist-to-hip ratio is also associated with significantly increased risk of colon polyps.

**Breast Cancer**

Epidemiologic studies consistently show that obesity is directly related to mortality from breast cancer, predominantly in postmenopausal women⁶, but inversely related to the incidence of premenopausal breast cancer⁴⁵. Ten or more years after menopause, the premenopausal "benefit" of obesity has dissipated. Among postmenopausal women, peripheral fat is the primary source of estrogens, the major modifiable risk factor for postmenopausal breast cancer. This crossover in the relationship of obesity with breast cancer, pre- and post-menopause, complicates prevention messages for this common female cancer. Recent data from the Nurses' Health Study, however, show that adult weight gain is positively related to risk of postmenopausal breast cancer. This relation is seen most clearly among women who do not use postmenopausal hormones. A gain of more than 20 lb from age 18 to midlife doubles a woman's risk of breast cancer. Even modest weight gains are positively related to risk of postmenopausal cancer.

**Endometrial Cancer**

Obesity increases the risk of endometrial cancer. The risk is three times higher among obese women (BMI ≥30 kg/m²) than among normal-weight women. However, the absolute risk of this condition is low when compared to breast cancer, heart disease, and diabetes.
Women’s Reproductive Health

Menstrual Function and Fertility
Obesity in premenopausal women is associated with menstrual irregularity and amenorrhea. As part of the Nurses’ Health Study, a case control study suggested that the greater the BMI at age 18 years, even at levels lower than those considered obese, the greater the risk of subsequent ovulatory infertility. The most prominent condition associated with abdominal obesity is polycystic ovarian syndrome, a combination of infertility, menstrual disturbances, hirsutism, abdominal hyperandrogenism, and anovulation. This syndrome is strongly associated with hyperinsulinemia and insulin resistance.

Pregnancy
Pregnancy can result in excessive weight gain and retention. The 1988 National Maternal and Infant Survey observed that 41.6 percent of women reported retaining 9 lb of their gained weight during pregnancy, with 33.8 percent reporting 14 lb of retained weight gain. The retained weight gain associated with pregnancy was corroborated by the study of Coronary Artery Risk Development in Young Adults (CARDIA). As a result of their first pregnancy, both black and white young women had a sustained weight gain of 2 to 3 kg (4.4 to 6.6 lb) of body weight.

Another study on a national cohort of women followed for 10 years reported that weight gain associated with childbearing ranged from 1.7 kg (3.7 lb) for those having one live birth during the study to 2.2 kg (4.9 lb) for those having three. In addition, higher prepregnancy weights have been shown to increase the risk of late fetal deaths.

Obesity during pregnancy is associated with increased morbidity for both the mother and the child. A tenfold increase in the prevalence of hypertension and a 10 percent incidence of gestational diabetes have been reported in obese pregnant women. Obesity also is associated with difficulties in managing labor and delivery, leading to a higher rate of induction and primary Caesarean section. Risks associated with anesthesia are higher in obese women, as there is greater tendency toward hypoxemia and greater technical difficulty in administering local or general anesthesia. Finally, obesity during pregnancy is associated with an increased risk of congenital malformations, particularly of neural tube defects.

A certain amount of weight gain during pregnancy is desirable. The fetus itself, expanded blood volume, uterine enlargement, breast tissue growth, and other products of conception generate an estimated 13 to 17 lb of extra weight. Weight gain beyond this, however, is predominantly maternal adipose tissue. It is this fat tissue that, in large measure, accounts for the postpartum retention of weight gained during pregnancy. In turn, this retention reflects a postpartum energy balance that does not lead to catabolism of the gained adipose tissue. In part,
this may reflect reduced energy expenditure through decreased physical activity, even while caring for young children, but it may also reflect retention of the pattern of increased caloric intake acquired during pregnancy.

One difficulty in developing recommendations of optimal weight gain during pregnancy relates to the health of the infants. A balance must be achieved between high-birth-weight infants who may pose problems during delivery and who may face a higher rate of Caesarean sections and low-birth-weight infants who face a higher infant mortality rate. However, data from the Pregnancy Nutrition Surveillance System from CDC showed that very overweight women would benefit from a reduced weight gain during pregnancy to help reduce the risk for high-birth-weight infants.

The Institute of Medicine report made recommendations concerning maternal weight gain. It recommended that each woman have her BMI measured and recorded at the time of entry into prenatal care. For women with a BMI of less than 20, the target weight gain should be 0.5 kg (1.1 lb) of weight gain per week during the second and third trimester. For a woman whose BMI is greater than 26, the weight gain target is 0.3 kg (0.7 lb) per week during the last two trimesters.

Assessment of Overweight and Obesity

Although accurate methods to assess body fat exist, the measurement of body fat by these techniques is expensive and is often not readily available to most clinicians. Two surrogate measures are important to assess body fat, BMI and waist index.

**Body Mass Index (BMI)**

BMI is recommended as a practical approach for assessing body fat in the clinical setting. It provides a more accurate measure of total body fat compared with the assessment of body weight alone.

The typical body weight tables are based on mortality outcomes, and they do not necessarily predict morbidity. However, BMI has some limitations. For example, BMI overestimates body fat in persons who are very muscular, and it can underestimate body fat in persons who have lost muscle mass (e.g., many elderly). BMI is a direct calculation based on height and weight, regardless of gender.

You can calculate BMI as follows:

1. Multiply weight (in pounds) by 703
2. Multiply height (in inches) by height (in inches)

3. Divide the answer in step 1 by the answer in step 2 to get the BMI.

Example: for a person who is 5 feet 5 inches tall weighing 180 lbs

<table>
<thead>
<tr>
<th>Step 1</th>
<th>180 x 703 = 126,540</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 2</td>
<td>65 x 65 = 4,225</td>
</tr>
<tr>
<td>Step 3</td>
<td>126,540 / 4,225 = 29.9</td>
</tr>
</tbody>
</table>

\[ \text{BMI} = 29.9 \]

<table>
<thead>
<tr>
<th>Classification of Overweight and Obesity by BMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obesity Class</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Underweight</td>
</tr>
<tr>
<td>Normal</td>
</tr>
<tr>
<td>Overweight</td>
</tr>
<tr>
<td>Obesity</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Extreme Obesity</td>
</tr>
</tbody>
</table>

The primary classification of overweight and obesity is based on the assessment of BMI. It should be noted that the relationship between BMI and disease risk varies among individuals and among different populations. Some individuals with mild obesity may have multiple risk factors; others with more severe obesity may have fewer risk factors.

Clinical judgment must be used in interpreting BMI in situations that may affect its accuracy as an indicator of total body fat. Examples of these situations include the presence of edema, high muscularity, muscle wasting, and individuals who are limited in stature. The relationship between BMI and body fat content varies somewhat with age, gender, and possibly ethnicity because of differences in the composition of lean tissue, sitting height, and hydration state. For example, older persons often have lost muscle mass; thus, they have more fat for a given BMI than younger persons. Women may have more body fat for a given BMI than men, whereas patients with clinical edema may have less fat for a given BMI compared with those without edema. Nevertheless, these circumstances do not markedly influence the validity of BMI for classifying individuals into broad categories of overweight and obesity in order to monitor the weight status of individuals in clinical settings.

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Waist Circumference

Waist circumference is the most practical tool a clinician can use to evaluate a patient’s abdominal fat before and during weight loss treatment. Computed tomography and magnetic resonance imaging are both more accurate but are impractical for routine clinical use. Fat located in the abdominal region is associated with a greater health risk than peripheral fat (i.e., fat in the gluteal-femoral region). Furthermore, abdominal fat appears to be an independent risk predictor when BMI is not markedly increased. Therefore, waist or abdominal circumference and BMI should be measured not only for the initial assessment of obesity but also for monitoring the efficacy of the weight loss treatment for patients with a BMI < 35.

High risk waist measurements:
Men: > 40 in (> 102 cm) Women: > 35 in (> 88 cm)

A high waist circumference is associated with an increased risk for type 2 diabetes, dyslipidemia, hypertension, and CVD in patients with a BMI between 25 and 34.9 kg/m2.

Measuring Waist Circumference
To measure waist circumference, locate the upper hip bone and the top of the right iliac crest. Place a measuring tape in a horizontal plane around the abdomen at the level of the iliac crest. Before reading the tape measure, ensure that the tape is snug, but does not compress the skin, and is parallel to the floor. The measurement is made at the end of a normal expiration.

Although waist circumference and BMI are interrelated, waist circumference provides an independent prediction of risk over and above that of BMI. The waist circumference measurement is particularly useful in patients who are categorized as normal or overweight in terms of BMI. For individuals with a BMI = 35, waist circumference adds little to the predictive power of the disease risk classification of BMI. A high waist circumference is associated with an increased risk for type 2 diabetes, dyslipidemia, hypertension, and CVD in patients with a BMI between 25 and 34.9 kg/m.

Monitoring changes in waist circumference over time may be helpful; it can provide an estimate of increases or decreases in abdominal fat, even in the absence of changes in BMI. Furthermore, in obese patients with metabolic complications, changes in waist circumference are useful predictors of changes in cardiovascular disease (CVD) risk factors. Men are at increased relative risk if they have a waist circumference greater than 40 inches (102 cm); women are at an increased relative risk if they have a waist circumference greater than 35 inches (88 cm).
There are ethnic and age-related differences in body fat distribution that modify the predictive validity of waist circumference as a surrogate for abdominal fat. In some populations (e.g., Asian Americans or persons of Asian descent), waist circumference is a better indicator of relative disease risk than BMI. For older individuals, waist circumference assumes greater value for estimating risk of obesity-related diseases.

**Assessment of Risk Status**

The patient's risk status should be assessed by determining the degree of overweight or obesity based on BMI, the presence of abdominal obesity based on waist circumference, and the presence of concomitant CVD risk factors or comorbidities. Some obesity-associated diseases and risk factors place patients in a very high risk category for subsequent mortality. These diseases will require aggressive modification of risk factors in addition to their own clinical management. Other obesity-associated diseases are less lethal, but still require appropriate clinical therapy. Obesity also has an aggravating influence on several cardiovascular risk factors. Identifying these risk factors is required as a guide to the intensity of clinical intervention.

**Determination of Relative Risk Status**

The table, below, defines relative risk categories according to BMI and waist circumference. It is important to note that these categories denote relative risk, not absolute risk. They relate to the need to institute weight loss therapy, and do not directly define the required intensity of risk factor modification. The latter is determined by estimation of absolute risk based on the presence of associated disease or risk factors.

<table>
<thead>
<tr>
<th>Classification of Overweight and Obesity by BMI, Waist Circumference and Associated Disease Risk</th>
<th>Disease Risk Relative to Normal Weight and Waist Circumference</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI (kg/m²)</td>
<td>Obesity Class</td>
</tr>
<tr>
<td>Underweight</td>
<td>&lt;18.5</td>
</tr>
<tr>
<td>Normal+</td>
<td>18.5 - 24.9</td>
</tr>
<tr>
<td>Overweight</td>
<td>25.0 - 29.9</td>
</tr>
<tr>
<td>Obesity</td>
<td>30.0 - 34.9</td>
</tr>
<tr>
<td></td>
<td>35.0 - 39.9</td>
</tr>
<tr>
<td>Extreme Obesity</td>
<td>≥40</td>
</tr>
</tbody>
</table>

**Determination of Absolute Risk Status**

Determining the patient's absolute risk status requires consideration of the degree of overweight, as well as the presence of existing diseases or risk factors. To do so requires taking into account the patient's history, physical examination,
and laboratory results. Of greatest urgency is the need to detect existing CVD or end-organ damage that trigger the need for intense risk factor modification as well as disease management. Since the major risk of obesity is indirect (obesity elicits or aggravates hypertension, dyslipidemias, and diabetes which cause cardiovascular complications), the management of obesity should be implemented in the context of these other risk factors. While there is no direct evidence demonstrating that addressing risk factors increases weight loss, treating the risk factors through weight loss is a recommended strategy.

Identification of Cardiovascular Risk Factors That Impart a High Absolute Risk

Patients can be classified as being at high absolute risk for obesity-related disorders if they have three or more of the multiple risk factors listed below. The presence of high absolute risk increases the intensity of cholesterol lowering therapy and blood pressure management.

- Cigarette smoking
- Hypertension: A patient is classified as having hypertension if systolic blood pressure is ≥ 140 mm Hg or diastolic blood pressure is ≥ 90 mm Hg, or if the patient is taking antihypertensive agents.
- High-risk low-density lipoprotein cholesterol: A high-risk LDL-cholesterol is defined as a serum concentration of ≥ 160 mg/dL. A borderline high-risk LDL-cholesterol (130 to 159 mg/dL) together with two or more other risk factors also confers high risk.
- Low high-density lipoprotein cholesterol: A low HDL-cholesterol is defined as a serum concentration of < 35 mg/dL.
- Impaired fasting glucose (IFG): The presence of clinical type 2 diabetes (fasting plasma glucose of ≥ 126 mg/dL or 2 hours postprandial plasma glucose of ≥ 200 mg/dL) is a major risk factor for CVD, and its presence alone places a patient in the category of very high absolute risk. IFG (fasting plasma glucose 110 to 125 mg/dL) is considered by many authorities to be an independent risk factor for cardiovascular (macrovascular) disease, justifying its inclusion among risk factors contributing to high absolute risk. Although including IFG as a separate risk factor for CVD departs from the ATP II and JNC VI reports, its inclusion in this list may be appropriate. IFG is well established as a risk factor for type 2 diabetes.
- Family history of premature CHD: A positive family history of premature CHD is defined as definite myocardial infarction or sudden death at or before 55 years of age in the father or other male first-degree relative, or at or before 65 years of age in the mother or other female first-degree relative.
- Age: Male ≥ 45 years Female ≥ 55 years (or postmenopausal)
Other Risk Factors

Other risk factors deserve special consideration for their relation to obesity. When these factors are present, patients can be considered to have incremental absolute risk above that estimated from the preceding risk factors. Quantitative risk contributions are not available for these risk factors, but their presence heightens the need for weight reduction in obese persons.

High triglycerides

Obesity is commonly accompanied by elevated serum triglycerides. The relationship between high triglycerides and CHD is complex. Triglyceride-rich lipoproteins may be directly atherogenic. In addition, elevated serum triglycerides are the most common manifestation of the atherogenic lipoprotein phenotype (high triglycerides, small LDL particles, and low HDL-cholesterol levels. Moreover, in the presence of obesity, high serum triglycerides are commonly associated with a clustering of metabolic risk factors known as the metabolic syndrome (atherogenic lipoprotein phenotype, hypertension, insulin resistance and glucose intolerance, and prothrombotic states). Thus, in obese patients, elevated serum triglycerides are a marker for increased cardiovascular risk. According to current guidelines (ATP II and JNC VI), the presence of high triglycerides does not modify the intensity of cholesterol or blood pressure lowering therapy. Their presence in obese patients, however, calls for an intensified effort to achieve weight reduction and increase physical activity. Both will reduce the various risk factors characteristic of the metabolic syndrome, and thus should reduce overall cardiovascular risk as well as decrease the risk for type 2 diabetes.

According to the ATP II guidelines, triglyceride levels are classified as follows:

<table>
<thead>
<tr>
<th>Category</th>
<th>Serum Triglyceride Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal triglycerides</td>
<td>Less than 200 mg/dL</td>
</tr>
<tr>
<td>Borderline-high triglycerides</td>
<td>200 to 400 mg/dL</td>
</tr>
<tr>
<td>High triglycerides</td>
<td>400 to 1,000 mg/dL</td>
</tr>
<tr>
<td>Very high triglycerides</td>
<td>Greater than 1,000 mg/dL</td>
</tr>
</tbody>
</table>

Behavioral Assessment

Assessment of patient motivation is a prerequisite for weight loss therapy. Weight reduction in the clinical setting represents a major investment of time and effort on the part of the health care team and expense to the patient. For these reasons, motivation for weight loss should be relatively high before initiating clinical therapy. At the same time, it is the duty of the practitioner to heighten a patient’s motivation for weight loss when such is perceived to be of significant benefit for risk reduction. This can be done by enumerating the dangers
associated with persistent obesity and by describing the strategy for clinically assisted weight reduction. For patients who are not motivated (or able) to enter clinical weight loss therapy, appropriate management of risk factors (e.g., high serum cholesterol, hypertension, smoking, and type 2 diabetes) is still necessary. Sustained weight reduction may facilitate control of cardiovascular risk factors and delay the onset of type 2 diabetes.

Clinical experience suggests that health care practitioners briefly consider the following issues when assessing an obese individual’s readiness for weight loss:

“Has the individual sought weight loss on his or her own initiative?”
Weight loss efforts are unlikely to be successful if patients feel that they have been forced into treatment by family members, their employer, or their physician. Before initiating treatment, health care practitioners should determine whether patients recognize the need and benefits of weight reduction and want to lose weight.

“What events have led the patient to seek weight loss now?”
Responses to this question will provide information about the patient’s weight loss motivation and goals. In most cases, individuals have been obese for many years. Something has happened to make them seek weight loss. The motivator differs from person to person.

“What are the patient’s stress level and mood?”
There may not be a perfect time to lose weight, but some are better than others. Individuals who report higher-than usual stress levels with work, family life, or financial problems may not be able to focus on weight control. In such cases, treatment may be delayed until the stressor passes, thus increasing the chances of success. Briefly assess the patient’s mood to rule out major depression or other complications. Reports of poor sleep, a low mood, or lack of pleasure in daily activities can be followed up to determine whether intervention is needed: it is usually best to treat the mood disorder before undertaking weight reduction.

“Does the individual have an eating disorder, in addition to obesity?”
Approximately 20 percent to 30 percent of obese individuals who seek weight reduction at university clinics suffer from binge eating. This involves eating an unusually large amount of food and experiencing loss of control while overeating. Binge eaters are distressed by their overeating, which differentiates them from persons who report that they “just enjoy eating and eat too much.” Ask patients which meals they typically eat and the times of consumption. Binge eaters usually do not have a regular meal plan; instead, they snack throughout the day. Although some of these individuals respond well to weight reduction therapy, the greater the patient’s distress or depression, or the more chaotic the eating pattern, the more likely the need for psychological or nutritional counseling.
“Does the individual understand the requirements of treatment and believe that he or she can fulfill them?”
Practitioner and patient together should select a course of treatment and identify the changes in eating and activity habits that the patient wishes to make. It is important to select activities that patients believe they can perform successfully. Patients should feel that they have the time, desire, and skills to adhere to a program that you have planned together.

“How much weight does the patient expect to lose? What other benefits does he or she anticipate?”
Obese individuals typically want to lose 2 to 3 times the 8 to 15 percent often observed and are disappointed when they do not. Practitioners must help patients understand that modest weight losses frequently improve health complications of obesity. Progress should then be evaluated by achievement of these goals, which may include sleeping better, having more energy, reducing pain, and pursuing new hobbies or rediscovering old ones, particularly when weight loss slows and eventually stops.

The following critical factors must also be evaluated to determine patient motivation:

- Reasons for weight loss—What is the extent of the patient's seriousness and readiness to undergo a sustained period of weight loss at this time? What is the patient's current attitude about making a life-long commitment to behavior change?
- Previous history of successful and unsuccessful weight loss attempts—What factors were responsible for previous failures and successes at weight loss or maintenance of normal body weight?
- Family, friends, and work-site support—What is the social framework in which the patient will attempt to lose weight, and who are the possible helpers and antagonists to such an attempt?
- The patient's understanding of overweight and obesity and how it contributes to obesity-associated diseases—Does the patient have an appreciation of the dangers of obesity, and are these dangers of significant concern to the patient?
- Attitude toward physical activity—Is the patient motivated to enter a program of increased physical activity to assist in weight reduction?
- Time availability—Is the patient willing to commit the time required to interact with health professionals in long-term weight loss therapy?
- Barriers—What are the obstacles that will interfere with the patient's ability to implement the suggestions for change?
- Financial considerations—Is the patient willing to pay for obesity therapy? This may include having to pay for travel to the medical facility, time lost from work, and paying for professional counseling that is not covered by insurance.

One of the most important aspects of the initial evaluation is to prepare patients for treatment. Reviewing patients' past attempts at weight loss and explaining
how the new treatment plan will be different can encourage patients and provide hope for successful weight loss. It is helpful to discuss the proposed course of treatment and describe necessary behaviors, such as keeping diaries of food intake and physical activity.

Finally, given the social stigmatization that obese patients often feel, even from health care professionals, the initial evaluation is an opportunity to show the patient respect, concern, and hope. A patient who has shared feelings about being overweight and previous attempts to lose weight with a sympathetic listener may be more willing to consider new ideas and information. A partnership in which the patient feels supported and understood can help to sustain the necessary motivation for the difficult task of weight loss and maintenance.

Management of Obesity

Treatment Guidelines

Although there is agreement about the health risks of overweight and obesity, there is less agreement about their management. Some have argued against treating obesity because of the difficulty in maintaining long-term weight loss, and because of the potentially negative consequences of weight cycling, a pattern frequently seen in obese individuals. Others argue that the potential hazards of treatment do not outweigh the known hazards of being obese.

The treatment guidelines provided are based on the most thorough examination of the scientific evidence reported to date on the effectiveness of various treatment strategies available for weight loss and weight maintenance.

Tailor Treatment to the Needs of the Patient

Standard treatment approaches for overweight and obesity must be tailored to the needs of various patients or patient groups. Large individual variation exists within any social or cultural group; furthermore, substantial overlap occurs among subcultures within the larger society. There is, therefore, no “cookbook” or standardized set of rules to optimize weight reduction with a given type of patient. However, obesity treatment programs that are culturally sensitive and incorporate a patient’s characteristics must do the following:

• Adapt the setting and staffing for the program.
• Understand how the obesity treatment program integrates into other aspects of the patient’s health care and self-care.
• Expect and allow modifications to a program based on a patient’s response and preferences.
Attitudes, Beliefs, and Histories.
In the patient-provider interaction, individual histories, attitudes, and beliefs may affect both parties.

The diagnosis of obesity is rarely new or news for the patient. Except for patients with very recent weight gain, the patient brings into the consulting room a history of dealing with a frustrating, troubling, and visible problem. Obese people are often the recipients of scorn and discrimination from strangers and, sometimes, hurtful comments from previous health care professionals. The patient with obesity may be understandably defensive about the problem.

Be careful to communicate a nonjudgmental attitude that distinguishes between the weight problem and the patient with the problem. Ask about the patient’s weight history and how obesity has affected his or her life. Express your concerns about the health risks associated with obesity, and how obesity is affecting the patient.

Similarly, most providers have had some frustrating experiences in dealing with patients with weight problems. Appropriate respect for the difficulty of long-term weight control may mutate into a reflexive sense of futility. When efforts to help patients lose weight are unsuccessful, the provider may be disappointed and may blame the patient for the failure, seeing obese people as uniquely noncompliant and difficult. Providers too may feel some anti-fat prejudice.

Objectively examine your own attitudes and beliefs about obesity and obese people. Remember, obesity is a chronic disease, like diabetes or hypertension. In a sense, patients are struggling against their own body’s coordinated effort to stop them from losing weight.

Compliance with most long-term treatment regimens that require behavior change is poor. Expectations should be realistic regarding the ease, amount, speed, and permanence of weight change.

Partnership with the Patient
The patient must be an active partner in the consultation and must participate in setting goals for behavior change. It is the patient who must make the changes to achieve weight loss; the patient already has goals concerning weight loss and how to achieve it. These goals may be different from those the provider would select.

The provider can be a source of general information, perspective, support, and some measure of guidance but cannot cause the patient to meet goals that he or she does not endorse.

When weight is first brought up, ask what the patient’s weight goals are. You may indicate that the patient’s weight goals are more ambitious than necessary for
health improvement, but acknowledge that the patient may have many other reasons for selecting a different goal.

Distinguish between the long-term result of weight loss and the short-term behavior changes (diet, activity, etc.) that are the means to that end. Emphasize that the patient will judge which specific goals to attempt and that your review of goal attainment is meant to evaluate the plan, not the patient. Also, emphasize that the most important thing the patient can do is to keep return appointments, even if goals have not been met.

**Set Achievable Goals**

Setting goals should be a collaborative activity. From all the available dietary and physical activity changes that might be made, a small number should be selected on the basis of their likely impact on weight and health, the patient’s current status, and the patient’s willingness and ability to implement them. Once goals are selected, an action plan can be devised to implement change.

After considering the recommended dietary and physical activity guidelines, the patient should be encouraged to select two or three goals that he or she is willing and able to take on. If the patient does not select an area that appears in need of change, inquire about the perceived costs and benefits of that achievement, without presenting it as mandatory. (“One thing that seems very important for most patients is physical activity. What are your thoughts about increasing your activity level?”) Assess the patient’s perceived ability to meet a specific goal. (“On a scale from 1 to 10, how confident are you that you can meet this goal?”) Effective goals are specific, attainable, and forgiving. Thus, “exercise more” would become “walk for 30 minutes, 3 days a week, for now.”

Shaping is a behavioral technique that involves selecting a series of short-term goals that get closer and closer to the ultimate goal (e.g., an initial reduction of fat intake from 40 percent of calories to 35 percent of calories and later to 30 percent). Once the patient has selected a goal, address briefly what has to be done to achieve it. (“What are the best days for you to take your walks? What time of day is best for you? What arrangements will you need to make for child care?”) Provide the patient with a written behavioral “prescription” listing the selected goals.

**Cultivate the Partnership**

Follow up visits are occasions for monitoring health and weight status and for monitoring responses to any medication regimens. They also provide the opportunity to assess progress toward the goals selected at the previous visit, to provide support and additional information, and to establish goals for the next visit. Imperfect goal attainment is often the norm. Focus on the positive changes, and adopt a problem-solving approach toward the shortfalls. This is achieved by communicating that the goal, not the patient, is at issue.
While in the waiting room, the patient can write down the outcomes of the previous goals, effects of the various aspects of the treatment program (diet, activity, medication), items to discuss with you, and possible targets for new goals.

In the consultation, a matter-of-degree approach can be communicated by questions such as “How many days a week were you able to walk?” rather than “Did you meet your walking goal?” Successes should receive positive attention and praise. If the patient has not successfully met a desired goal, emphasize the extent to which he or she approached the goal. (“So even though you weren’t able to walk 4 days each week, you did get out there at least twice a week.”)

Acknowledge the challenging nature of weight control by adopting problem-solving responses to goals that are not fully met. Emphasize that examining the circumstances of unmet goals can lead to new and more effective strategies. (“What do you think interfered with your walking plans on the days you didn’t walk?”)

Emphasize that weight control is a journey, not a destination, and that some missteps are inevitable opportunities to learn how to be more successful. Set goals for the next visit in collaboration with the patient. These goals should be based on the outcome of the previous goals, consideration of the patient-selected targets, and assessment of the patient’s status. If a previous goal was missed by a wide margin, it may be useful to lower the goal somewhat.

**Modify Patient Behaviors**
Proven behavior modification techniques can be used to assist patients in weight control. Some can be communicated readily in person or via written materials. Goals may include the use of one or more of these techniques.

**Self-monitoring** refers to observing and recording some aspect of behavior, such as caloric intake, exercise sessions, medication usage, etc., or an outcome of these behaviors, such as changes in body weight. Self-monitoring of a behavior usually changes the behavior in the desired direction and can produce real-time records for your review. Some patients find that specific self-monitoring forms make it easier, while others prefer to use their own recording system. Recording dietary intake (food choices, amounts, times), although seen as a chore by some patients, is a very useful application of self-monitoring. Although some patients prefer daily weighing and others do better with less frequent steps on the scale, regular self-monitoring of weight is crucial for long-term maintenance.

**Rewards** can be used to encourage attainment of behavioral goals, especially those that have been difficult to reach. An effective reward is something that is desirable, timely, and contingent on meeting the goal. Patient administered rewards may be tangible (e.g., a movie, music CD, or payment toward buying a...
more costly item) or intangible (e.g., an afternoon off work or an hour of quiet time away from family). Numerous small rewards, delivered for meeting smaller goals, are preferable to bigger rewards that require a long, difficult effort.

**Stimulus control** changes involve learning what social or environmental cues seem to encourage undesired eating and then modifying those cues. For example, a patient may learn from reflection or from self-monitoring records that he or she is more likely to overeat while watching television, or whenever treats are on display by the office coffeepot, or when around a certain friend. The resulting strategies may be to sever the association of eating from the cue (do not eat while watching television), avoid or eliminate the cue (leave the coffee room immediately after pouring coffee), or change the circumstances surrounding the cue (plan to meet with the friend in a setting where food is not available). In general, visible and accessible food items are often cues for unplanned eating.

Dietary behavior changes can make it easier to eat less without feeling deprived. An important change is to slow the rate of eating to allow satiety signals to begin to develop before the end of the meal. Another tactic is to use smaller plates so that moderate portions do not appear meager. Changing the scheduling of eating can be helpful for patients who skip or delay meals, then overeat later.

**Focus on What Matters**
Improvement of the patient’s health is the goal of obesity treatment. Monitoring progress is a continuous process of motivational importance to the patient and provider. Simple, clear records of body weight, relevant risk factors, other health parameters, and goal attainment should be kept.

Use simple charts or graphs to summarize changes in weight and the associated risk factors that were present initially or suggested by the patient’s family history. For example, for a patient presenting with a BMI of 33, hypertension, and a family history of type 2 diabetes, a chart might include successive measures of weight, BMI, waist circumference, blood pressure, and fasting blood glucose. Copy these records for the patient.

The initial goal of weight loss therapy for overweight patients is a reduction in body weight of about 10 percent. If this target is achieved, consideration may be given to further weight loss. In general, patients will wish to lose more than 10 percent of body weight; they will need to be counseled about the appropriateness of this initial goal. Further weight loss can be considered after this initial goal is achieved and maintained for 6 months.

The rationale for the initial 10-percent goal is that a moderate weight loss of this magnitude can significantly decrease the severity of obesity associated risk factors. It is better to maintain a moderate weight loss over a prolonged period
than to regain weight from a marked weight loss. The latter is counterproductive in terms of time, cost, and self-esteem.

Rate of Weight Loss

A reasonable time to achieve a 10-percent reduction in body weight is 6 months of therapy. To achieve a significant loss of weight, an energy deficit must be created and maintained.

Weight should be lost at a rate of 1 to 2 pounds per week, based on a caloric deficit between 500 and 1,000 kcal/day. After 6 months, theoretically, this caloric deficit should result in a loss of between 26 and 52 pounds. However, the average weight loss actually observed over this time is between 20 and 25 pounds. A greater rate of weight loss does not yield a better result at the end of 1 year.37

It is difficult for most patients to continue to lose weight after 6 months because of changes in resting metabolic rates and problems with adherence to treatment strategies. Because energy requirements decrease as weight is decreased, diet and physical activity goals need to be revised so that an energy deficit is created at the lower weight, allowing the patient to continue to lose weight.

To achieve additional weight loss, the patient must further decrease calories and/or increase physical activity. Many studies show that rapid weight reduction is almost always followed by gain of the lost weight. Moreover, with rapid weight reduction, there is an increased risk for gallstones and, possibly, electrolyte abnormalities.

Weight Maintenance at a Lower Weight

Once the goals of weight loss have been successfully achieved, maintenance of a lower body weight becomes the major challenge. In the past, obtaining the goal of weight loss was considered the end of weight loss therapy. Unfortunately, once patients are dismissed from clinical therapy, they frequently regain the lost weight.

After 6 months of weight loss, the rate at which the weight is lost usually declines, then plateaus. The practitioner and patient should recognize that, at this point, weight maintenance, the second phase of the weight loss effort, should take priority. Successful weight maintenance is defined as a regain of weight that is less than 6.6 pounds (3 kg) in 2 years and a sustained reduction in waist circumference of at least 1.6 inches (4 cm). If a patient wishes to lose more weight after a period of weight maintenance, the procedure for weight loss, outlined above, can be repeated.
After a patient has achieved the targeted weight loss, the combined modalities of therapy (dietary therapy, physical activity, and behavior therapy) must be continued indefinitely; otherwise, excess weight will likely be regained.

Numerous strategies are available for motivating the patient; all of these require that the practitioner continue to communicate frequently with the patient. Long-term monitoring and encouragement can be accomplished in several ways: by regular clinic visits, at group meetings, or via telephone or e-mail. The longer the weight maintenance phase can be sustained, the better the prospects for long-term success in weight reduction.

**Weight Management Therapies**

Effective weight control involves multiple techniques and strategies including dietary therapy, physical activity, behavior therapy, pharmacotherapy, and surgery as well as combinations of these strategies. Relevant treatment strategies can also be used to foster long-term weight control and prevention of weight gain.

Some strategies such as modifying dietary intake and physical activity can also impact on obesity-related comorbidities or risk factors.

Increased physical activity is not only important for weight loss and weight loss maintenance but also impacts on other comorbidities and risk factors such as high blood pressure, and high blood cholesterol levels. Reducing body weight in overweight and obese patients not only helps reduce the risk of these comorbidities from developing but also helps in their management. Weight management techniques need to take into account the needs of individual patients so they should be culturally sensitive and incorporate the patient’s perspectives and characteristics. Treatment of overweight and obesity is to be taken seriously since it involves treating an individual’s disease over the long term as well as making modifications to a way of life for entire families.

**Dietary Therapy**

In the majority of overweight and obese patients, adjustment of the diet will be required to reduce caloric intake. Dietary therapy includes instructing patients in the modification of their diets to achieve a decrease in caloric intake.

A diet that is individually planned to help create a deficit of 500 to 1,000 kcal/day should be an integral part of any program aimed at achieving a weight loss of 1 to 2 pounds per week. A key element of the current recommendation is the use of a moderate reduction in caloric intake, which is designed to achieve a slow, but progressive, weight loss. Ideally, caloric intake should be reduced only to the level that is required to maintain weight at a desired level. If this level of caloric
intake is achieved, excess weight will gradually decrease. In practice, somewhat greater caloric deficits are used in the period of active weight loss, but diets with a very low-calorie content are to be avoided. Finally, the composition of the diet should be modified to minimize other cardiovascular risk factors.

The centerpiece of dietary therapy for weight loss in overweight or obese patients is a low calorie diet (LCD). This diet is different from a very low calorie diet (VLCD) (less than 800 kcal/day). In general, diets containing 1,000 to 1,200 kcal/day should be selected for most women; a diet between 1,200 kcal/day and 1,600 kcal/day should be chosen for men and may be appropriate for women who weigh 165 pounds or more, or who exercise regularly.

If the patient can stick with the 1,600 kcal/day diet but does not lose weight you may want to try the 1,200 kcal/day diet. If a patient on either diet is hungry, you may want to increase the calories by 100 to 200 per day. VLCDs should not be used routinely for weight loss therapy because they require special monitoring and supplementation.

VLCDs are used only in very limited circumstances by specialized practitioners experienced in their use. Moreover, clinical trials show that LCDs are as effective as VLCDs in producing weight loss after 1 year.

Successful weight reduction by LCDs is more likely to occur when consideration is given to a patient’s food preferences in tailoring a particular diet. Care should be taken to ensure that all of the recommended dietary allowances are met; this may require the use of a dietary or vitamin supplement. Dietary education is necessary to assist in the adjustment to a LCD. Educational efforts should pay particular attention to the following topics:

1. Energy value of different foods.
2. Food composition—fats, carbohydrates (including dietary fiber), and proteins.
3. Evaluation of nutrition labels to determine caloric content and food composition.
4. New habits of purchasing—give preference to low-calorie foods.
5. Food preparation—avoid adding high-calorie ingredients during cooking (e.g., fats and oils).
6. Avoiding overconsumption of high-calorie foods (both high-fat and high-carbohydrate foods).
7. Adequate water intake.
8. Reduction of portion sizes.
9. Limiting alcohol consumption.

**Physical Activity**

Physical activity should be an integral part of weight loss therapy and weight maintenance. Initially, moderate levels of physical activity for 30 to 45 minutes, 3
to 5 days per week, should be encouraged. An increase in physical activity is an important component of weight loss therapy, although it will not lead to a substantially greater weight loss than diet alone over 6 months.

Most weight loss occurs because of decreased caloric intake. Sustained physical activity is most helpful in the prevention of weight regain.

In addition, physical activity is beneficial for reducing risks for cardiovascular disease and type 2 diabetes, beyond that produced by weight reduction alone. Many people live sedentary lives, have little training or skills in physical activity, and are difficult to motivate toward increasing their activity. For these reasons, starting a physical activity regimen may require supervision for some people. The need to avoid injury during physical activity is a high priority.

Extremely obese persons may need to start with simple exercises that can be intensified gradually. The practitioner must decide whether exercise testing for cardiopulmonary disease is needed before embarking on a new physical activity regimen. This decision should be based on a patient’s age, symptoms, and concomitant risk factors.

For most obese patients, physical activity should be initiated slowly, and the intensity should be increased gradually. Initial activities may be increasing small tasks of daily living such as taking the stairs or walking or swimming at a slow pace. With time, depending on progress, the amount of weight lost, and functional capacity, the patient may engage in more strenuous activities. Some of these include fitness walking, cycling, rowing, cross-country skiing, aerobic dancing, and jumping rope. Jogging provides a high-intensity aerobic exercise, but it can lead to orthopedic injury. If jogging is desired, the patient’s ability to do this must first be assessed. The availability of a safe environment for the jogger is also a necessity. Competitive sports, such as tennis and volleyball, can provide an enjoyable form of physical activity for many, but again, care must be taken to avoid injury, especially in older people.

A moderate amount of physical activity can be achieved in a variety of ways. People can select activities that they enjoy and that fit into their daily lives. Because amounts of activity are functions of duration, intensity, and frequency, the same amounts of activity can be obtained in longer sessions of moderately intense activities (such as brisk walking) as in shorter sessions of more strenuous activities (such as running).

A regimen of daily walking is an attractive form of physical activity for many people, particularly those who are overweight or obese. The patient can start by walking 10 minutes, 3 days a week, and can build to 30 to 45 minutes of more intense walking at least 3 days a week and increase to most, if not all, days.
With this regimen, an additional 100 to 200 kcal/day of physical activity can be expended. Caloric expenditure will vary depending on the individual’s body weight and the intensity of the activity.

This regimen can be adapted to other forms of physical activity, but walking is particularly attractive because of its safety and accessibility. With time, a larger weekly volume of physical activity can be performed that would normally cause a greater weight loss if it were not compensated by a higher caloric intake.

Reducing sedentary time, i.e., time spent watching television or playing video games, is another approach to increasing activity. Patients should be encouraged to build physical activities into each day. Examples include leaving public transportation one stop before the usual one, parking farther than usual from work or shopping, and walking up stairs instead of taking elevators or escalators.

New forms of physical activity should be suggested (e.g., gardening, walking a dog daily, or new athletic activities). Engaging in physical activity can be facilitated by identifying a safe area to perform the activity (e.g., community parks, gyms, pools, and health clubs). However, when these sites are not available, an area of the home can be identified and perhaps outfitted with equipment such as a stationary bicycle or a treadmill. Health care professionals should encourage patients to plan and schedule physical activity 1 week in advance, budget the time necessary to do it, and document their physical activity by keeping a diary and recording the duration and intensity of exercise.

The following are examples of activities at different levels of intensity. A moderate amount of physical activity is roughly equivalent to physical activity that uses approximately 150 calories of energy per day, or 1,000 calories per week.

**Very light activity** would include increased standing activities, room painting, pushing a wheelchair, ironing, cooking, and playing a musical instrument.

**Light activity** would include slow walking (24 min/mile), garage work, carpentry, house cleaning, child care, golf, sailing, and recreational table tennis.

**Moderate activity** would include walking a 15-minute mile, weeding and hoeing a garden, carrying a load, cycling, skiing, tennis, and dancing.

**High activity** would include jogging a mile in 10 minutes, walking with a load uphill, tree felling, heavy manual digging, basketball, climbing, and soccer.

**Other key activities** would include flexibility exercises to attain full range of joint motion, strength or resistance exercises, and aerobic conditioning.
Exercise Considerations
Very large people face special challenges in trying to be active. They may not be able to bend or move in the same way that other people can. It may be hard to find clothes and equipment for exercising. They may also feel self-conscious being physically active around other people.

Walking
If the patient is not normally active, they should start slowly. Begin by walking 5 minutes a day for the first week. Walk 8 minutes the next week. Stay at 8–minute walks until they feel comfortable. Then increase the walks to 11 minutes. Slowly lengthen each walk by 3 minutes—or walk faster.

Tips for walking:
- The patient should wear comfortable walking shoes with a lot of support. If they walk often, they may need to buy new shoes every 6 to 8 months.
- Wear garments that prevent inner thigh chafing, such as tights or spandex shorts.
- Make walking fun. Walk with a friend or pet. Walk in places they enjoy, like a park or shopping mall.

Dancing
The patient can dance in a health club, in a nightclub, or at home. To dance at home, just have them move their body to some lively music. Dancing on their feet is a good weight-bearing activity, however, if they can’t stand for very long, encourage them to dance while seated.

Water Workouts
The patient does not need to know how to swim to work out in water—they can do shallow-water or deep-water exercises without swimming.

For shallow-water exercise, the water level should be between their waist and their chest. If the water is too shallow, it will be hard to move their arms underwater. If the water is deeper than chest height, it will be hard to keep their feet touching the pool bottom.

For deep-water exercise, most of the patient’s body is underwater. This means that the whole body will get a good workout. For safety and comfort, they should wear a foam belt or life jacket.

Weight Training
The patient does not need benches or bars to begin weight training at home. They can use a pair of hand weights or even two soup cans. Make sure they know the correct posture and that their movements are slow and controlled. Before the patient buys a home gym, they should check its weight rating (the number of pounds it can support) to make sure it is safe for their size.
Bicycling
Bicycling can be done indoors on a stationary bike, or outdoors on a road bike. The patient may benefit from using a recumbent bike because the seat on a recumbent bike is usually wider than the seat on an upright bike. For biking outdoors, they may want to try a mountain bike. These bikes have wider tires and are generally heavy duty. As with the home gym, the patient should make sure that the bike that they buy has a weight rating at least as high as their own weight.

Lifestyle Activities
Lifestyle physical activities do not have to be planned. The patient can make small changes to make their day more physically active and improve their health. For example,
- Take 2- to 3-minute walking breaks at work a few times a day.
- Put away the TV remote control—get up to change the channel.
- March in place during TV commercials.
- Sit in a rocking chair and push off the floor with their feet.
- Take the stairs instead of the elevator.

Exercise Safety Tips
The patient should be reminded to stop their activity immediately if they experience any of the following:
- have pain, tightness, or pressure in their chest or left neck, shoulder, or arm
- have shortness of breath
- feel dizzy or sick
- break out in a cold sweat
- have muscle cramps
- feel pain in their joints, feet, ankles, or legs.

Behavior Therapy
Behavioral strategies to reinforce changes in diet and physical activity can produce a weight loss in obese adults in the range of 10 percent of baseline weight over 4 months to 1 year. Unless a patient acquires a new set of eating and physical activity habits, long-term weight reduction is unlikely to succeed. The acquisition of new habits is particularly important for long-term weight maintenance at a lower weight. Most patients return to baseline weights in the absence of continued intervention. Thus, healthcare professionals must become familiar with techniques for modifying life habits of overweight or obese patients. The goal of behavior therapy is to alter the eating and activity habits of an obese patient. Techniques for behavior therapy have been developed to assist patients in modifying their life habits.

Behavior therapies provide methods for overcoming barriers to compliance with dietary therapy and/or increased physical activity, and are thus important components of weight loss therapy. Most weight loss programs incorporating
behavioral strategies do so as a package that includes education about nutrition and physical activity. However, this standard "package" of management should not ignore the need for individualizing behavioral strategies. No single method or combination of behavioral methods proved to be clearly superior. Thus, various strategies can be used by the practitioner to modify patient behavior. The aim is to change eating and physical activity behaviors over the long term. Such change can be achieved either on an individual basis or in group settings. Group therapy has the advantage of lower cost. Specific behavioral strategies include the following:

**Self-monitoring of both eating habits and physical activity**—Objectifying one's own behavior through observation and recording is a key step in behavior therapy. Patients should be taught to record the amount and types of food they eat, the caloric values, and nutrient composition. Keeping a record of the frequency, intensity, and type of physical activity likewise will add insight to personal behavior. Extending records to time, place, and feelings related to eating and physical activity will help to bring previously unrecognized behavior to light.

**Stress management** — Stress can trigger dysfunctional eating patterns, and stress management can defuse situations leading to overeating. Coping strategies, meditation, and relaxation techniques all have been successfully employed to reduce stress.

**Stimulus control** — Identifying stimuli that may encourage incidental eating enables individuals to limit their exposure to high-risk situations. Examples of stimulus control strategies include learning to shop carefully for healthy foods, keeping high-calorie foods out of the house, limiting the times and places of eating, and consciously avoiding situations in which overeating occurs.

**Problem solving** — This term refers to the self-corrections of problem areas related to eating and physical activity. Approaches to problem solving include identifying weight-related problems, generating or brainstorming possible solutions and choosing one, planning and implementing the healthier alternative, and evaluating the outcome of possible changes in behavior. Patients should be encouraged to reevaluate setbacks in behavior and to ask "What did I learn from this attempt?" rather than punishing themselves.

**Contingency management** — Behavior can be changed by use of rewards for specific actions, such as increasing time spent walking or reducing consumption of specific foods. Verbal as well as tangible rewards can be useful, particularly for adults. Rewards can come from either the professional team or from the patients themselves. For example, self-rewards can be monetary or social and should be encouraged.
Cognitive restructuring — Unrealistic goals and inaccurate beliefs about weight loss and body image need to be modified to help change self-defeating thoughts and feelings that undermine weight loss efforts. Rational responses designed to replace negative thoughts are encouraged. For example, the thought, "I blew my diet this morning by eating that doughnut; I may as well eat what I like for the rest of the day," could be replaced by a more adaptive thought, such as, "Well, I ate the doughnut this morning, but I can still eat in a healthy manner at lunch and dinner."

Social support — A strong system of social support can facilitate weight reduction. Family members, friends, or colleagues can assist an individual in maintaining motivation and providing positive reinforcement. Some patients may benefit by entering a weight reduction support group. Overweight patients should be asked about (possibly) overweight children and family weight control strategies. Parents and children should work together to engage in and maintain healthy dietary and physical activity habits.

Combined Therapy
To achieve the greatest likelihood of success from weight loss therapy, the combination of dietary therapy with an LCD, increased physical activity, and behavior therapy will be required. Inclusion of behavior therapy and increased physical activity in a weight loss regimen will provide the best opportunity for weight loss, and hopefully for long-term weight control. In order to achieve weight loss, such a regimen should be maintained for at least 6 months before considering pharmacotherapy.

Pharmacotherapy
Prescription weight-loss medications should be used only by patients who are at increased medical risk because of their weight. They should not be used for "cosmetic" weight loss. Prescription weight-loss drugs are approved only for those with a body mass index (BMI) of 30 and above, or 27 and above if they have obesity-related conditions, such as high blood pressure, dyslipidemia, or type 2 diabetes.

Although most side effects of prescription medications for obesity are mild, serious complications have been reported. Also, there are few studies lasting more than 2 years evaluating the safety or effectiveness of weight-loss medications. Weight-loss medications should always be combined with a program of healthy eating and regular physical activity.

Appetite Suppressants.
Most available weight-loss medications approved by the Food and Drug Administration (FDA) are appetite-suppressant medications. Appetite-suppressant medications promote weight loss by decreasing appetite or increasing the feeling of being full. These medications make you feel less hungry.
by increasing one or more brain chemicals that affect mood and appetite. Phentermine and sibutramine are the most commonly prescribed appetite-suppressants in the U.S.

**Lipase inhibitors.**
One drug works in a different way. Orlistat works by reducing the body’s ability to absorb dietary fat by about one third. It does this by blocking the enzyme lipase, which is responsible for breaking down dietary fat. When fat is not broken down, the body cannot absorb it, so fewer calories are taken in.

**Other medications** (not FDA-approved for the treatment of obesity).

- **Drugs to treat depression.** Some antidepressant medications have been studied as appetite-suppressant medications. While these medications are FDA-approved for the treatment of depression, their use in weight loss is an “off-label” use (see box). Studies of these medications generally have found that patients lose modest amounts of weight for up to 6 months, and tend to regain weight while they are still on the drug. One exception is bupropion. In one study, patients taking bupropion maintained weight loss for up to 1 year.

- **Drugs to treat seizures.** Two medications used to treat seizures, topiramate and zonisamide, have been shown to cause weight loss. Whether these drugs will be useful in treating obesity is being studied.

- **Drugs to treat diabetes.** The diabetes medication metformin may promote small amounts of weight loss in people with obesity and type 2 diabetes. How this medication promotes weight loss is not clear, although research has shown reduced hunger and food intake in people taking the drug.

- **Drug combinations.** The combined drug treatment using fenfluramine and phentermine (“fen/phen”) is no longer available due to the withdrawal of fenfluramine from the market after some patients experienced serious heart and lung disorders. Little information is available about the safety or effectiveness of other drug combinations for weight loss, including fluoxetine/phentermine, phendimetrazine/phentermine, orlistat/sibutramine, herbal combinations, or others.

- **Drugs in development.** Many medications are being tested as potential treatments for obesity. Two are being studied with patients in clinical trials. Rimonabant affects brain chemicals and ciliary neurotrophic factor affects hormones to control appetite. Currently, these medications are only available in clinical trials. Clinical trials are research studies with human volunteers so that specific health questions can be answered.
### Benefits

People respond differently to weight-loss medications, and some people experience more weight loss than others. Weight-loss medications lead to an average weight loss of 5 to 22 pounds more than what you might lose with non-drug obesity treatments. Some patients using medication lose more than 10 percent of their starting body weight. Maximum weight loss usually occurs within 6 months of starting medication treatment. Weight then tends to level off or increase during the remainder of treatment.

Over the short term, weight loss in individuals who are obese may reduce a number of health risks. Studies have found that weight loss with some medications improves blood pressure, blood cholesterol, triglycerides (fats), and insulin resistance (the body’s inability to use blood sugar). New research suggests that long-term use of weight-loss medications may help individuals keep off the weight they have lost. However, more studies are needed to determine the long-term effects of weight-loss medications on weight and health.

### Potential Risks

When considering long-term weight-loss medication treatment for obesity, you should consider the following areas of concern and potential risks.

- **Potential for abuse or dependence.** Currently, all prescription medications to treat obesity except orlistat are controlled substances, meaning doctors need to follow certain restrictions when prescribing them. Although abuse and dependence are not common with non-amphetamine appetite-suppressant medications, doctors should be cautious when they...
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prescribe these medications for patients with a history of alcohol or other drug abuse.

• **Development of tolerance.** Most studies of weight-loss medications show that a patient’s weight tends to level off after 6 months while still on medication. Although some patients and doctors may be concerned that this shows tolerance to the medications, the leveling off may mean that the medication has reached its limit of effectiveness. Based on the currently available studies, it is not clear if weight gain with continuing treatment is due to drug tolerance. It is clear, however, that weight gain would be much faster if the patient stopped taking the drug.

• **Reluctance to view obesity as a chronic disease.** Obesity often is viewed as the result of a lack of willpower, weakness, or a lifestyle “choice”—the choice to overeat and underexercise. Such social views on obesity should not prevent patients from seeking medical treatment to prevent health risks that can cause serious illness and death. Weight-loss medications, however, are not “magic bullets” or a one-shot fix for this chronic disease. They should be combined with a healthy eating plan and increased physical activity.

• **Side effects.** Because weight-loss medications are used to treat a condition that affects millions of people, many of whom are basically healthy, the possibility that side effects may outweigh benefits is of great concern. Most side effects of these medications are mild and usually improve with continued treatment. Rarely, serious and even fatal outcomes have been reported. Side effects of medications are explained below.

**Orlistat.** Some side effects of orlistat include cramping, intestinal discomfort, passing gas, diarrhea, and leakage of oily stool. These side effects are generally mild and temporary, but may be worsened by eating foods that are high in fat. Also, because orlistat reduces the absorption of some vitamins, patients should take a multivitamin at least 2 hours before or after taking orlistat.

**Sibutramine.** The main side effects of sibutramine are increases in blood pressure and heart rate, which are usually small but may be of concern in some patients. Other side effects include headache, dry mouth, constipation, and insomnia. People with poorly controlled high blood pressure, heart disease, irregular heartbeat, or history of stroke should not take sibutramine, and all patients taking the medication should have their blood pressure monitored on a regular basis.

**Other appetite suppressants.** Phentermine, phendimetrazine, and diethylpropion may cause symptoms of sleeplessness, nervousness, and euphoria (feeling of well-being). People with heart disease, high blood pressure, an overactive thyroid gland, or glaucoma should not use these drugs. Two appetite-suppressant medications, fenfluramine and dexfenfluramine, were withdrawn from the market in 1997. These drugs, used alone and in combination
with phentermine (“fen/phen”) were linked to the development of valvular heart disease and primary pulmonary hypertension (PPH), a rare but potentially fatal disorder that affects the blood vessels in the lungs. There have been only a few case reports of PPH in patients taking phentermine alone, but the possibility that phentermine use is associated with PPH cannot be ruled out.

**Weight Loss Surgery**

Weight loss surgery is an option for weight reduction in patients with clinically severe obesity, i.e., a BMI ≥40, or a BMI ≥ 35 with comorbid conditions. Weight loss surgery should be reserved for patients in whom other methods of treatment have failed and who have clinically severe obesity (once commonly referred to as “morbid obesity”). Weight loss surgery provides medically significant sustained weight loss for more than 5 years in most patients.

Lifelong medical monitoring after surgery is a necessity. Perioperative complications vary with weight and the overall health of the individual. In the published literature, young patients without comorbidities with a BMI < 50 kg/m2 who have undergone surgery have mortality rates less than 1 percent, whereas massively obese patients with a BMI > 60 kg/m2 who are also diabetic, hypertensive, and in cardiopulmonary failure may have mortality rates that range from 2 to 4 percent. Operative complications, including anastomotic leak, subphrenic abscess, splenic injury, pulmonary embolism, wound infection, and stoma stenosis, occur in less than 10 percent of patients.

An integrated program that provides guidance on diet, physical activity, and psychosocial concerns before and after surgery is necessary. Most patients fare remarkably well with reversal of diabetes, control of hypertension, marked improvement in mobility, return of fertility, cure of pseudotumor cerebri, and significant improvement in quality of life. Late complications are uncommon, but some patients may develop incisional hernias, gallstones, and, less commonly, weight loss failure and dumping syndrome.

Patients who do not follow the instructions to maintain an adequate intake of vitamins and minerals may develop deficiencies of vitamin B12 and iron with anemia. Neurologic symptoms may occur in unusual cases. Thus, surveillance should include monitoring indices of inadequate nutrition. Documentation of improvement in preoperative comorbidities is beneficial and advised.

Gastrointestinal surgery for obesity, also called bariatric surgery, alters the digestive process. The operations can be divided into three types: restrictive, malabsorptive, and combined restrictive/malabsorptive. Restrictive operations limit food intake by creating a narrow passage from the upper part of the stomach into the larger lower part, reducing the amount of food the stomach can hold and slowing the passage of food through the stomach. Malabsorptive operations do
not limit food intake, but instead exclude most of the small intestine from the digestive tract so fewer calories and nutrients are absorbed. Malabsorptive operations, also called intestinal bypasses, are no longer recommended because they result in severe nutritional deficiencies. Combined operations use stomach restriction and a partial bypass of the small intestine.

There are several types of restrictive and combined operations. Each one has its own benefits and risks.

**Restrictive Operations**

Purely restrictive operations only limit food intake and do not interfere with the normal digestive process. To perform the operation, doctors create a small pouch at the top of the stomach where food enters from the esophagus. At first, the pouch holds about 1 ounce of food and later may stretch to 2-3 ounces. The lower outlet of the pouch is usually about ½ inch in diameter or smaller. This small outlet delays the emptying of food from the pouch into the larger part of the stomach and causes a feeling of fullness.

After the operation, patients can no longer eat large amounts of food at one time. Most patients can eat about ½ to 1 cup of food without discomfort or nausea, but the food has to be soft, moist, and well chewed. Patients who undergo restrictive procedures generally are not able to eat as much as those who have combined operations.

Purely restrictive operations for obesity include adjustable gastric banding (AGB) and vertical banded gastroplasty (VBG).

1. **Adjustable gastric banding.** In this procedure, a hollow band made of silicone rubber is placed around the stomach near its upper end, creating a small pouch and a narrow passage into the rest of the stomach (figure 2). The band is then inflated with a salt solution through a tube that connects the band to an access port placed under the skin. It can be tightened or loosened over time to change the size of the passage by increasing or decreasing the amount of salt solution.

2. **Vertical banded gastroplasty.** VBG uses both a band and staples to create a small stomach pouch, as illustrated in figure 3. Once the most common restrictive operation, VBG is not often used today.

**Advantages:** Restrictive operations are easier to perform and are generally safer than malabsorptive operations. AGB is usually done via laparoscopy, which uses smaller incisions, creates less tissue damage, and involves shorter operating time and hospital stays than open procedures. Restrictive operations can be...
reversed if necessary, and result in few nutritional deficiencies.

**Disadvantages:** Patients who undergo restrictive operations generally lose less weight than patients who have malabsorptive operations, and are less likely to maintain weight loss over the long term. Patients generally lose about half of their excess body weight in the first year after restrictive procedures. However, in the first 3 to 5 years after VBG patients may regain some of the weight they lost. By 10 years, as few as 20 percent of patients have kept the weight off. (Although there is less information about long-term results with AGB, there is some evidence that weight loss results are better than with VBG.) Some patients regain weight by eating high-calorie soft foods that easily pass through the opening to the stomach. Others are unable to change their eating habits and do not lose much weight to begin with. Successful results depend on the patient’s willingness to adopt a long-term plan of healthy eating and regular physical activity.

**Risks:** One of the most common risks of restrictive operations is vomiting, which occurs when the patient eats too much or the narrow passage into the larger part of the stomach is blocked. Another is slippage or wearing away of the band. A common risk of AGB is breaks in the tubing between the band and the access port. This can cause the salt solution to leak, requiring another operation to repair. Some patients experience infections and bleeding, but this is much less common than other risks. Between 15 and 20 percent of VBG patients may have to undergo a second operation for a problem related to the procedure. Although restrictive operations are the safest of the bariatric procedures, they still carry risk—in less than 1 percent of all cases, complications can result in death.

**Combined Restrictive/Malabsorptive Operations**

Combined operations are the most common bariatric procedures. They restrict both food intake and the amount of calories and nutrients the body absorbs.

1. **Roux-en-Y gastric bypass (RGB).** This operation, illustrated in figure 4, is the most common and successful combined procedure in the United States. First, the surgeon creates a small stomach pouch to restrict food intake. Next, a Y-shaped section of the small intestine is attached to the pouch to allow food to bypass the lower stomach, the duodenum (the first segment of the small intestine), and the first portion of the jejunum (the second segment of the small intestine). This reduces the amount of calories and nutrients the body absorbs. Rarely, a cholecystectomy (gall bladder removal) is performed to avoid the gallstones that may result from rapid weight loss. More commonly, patients take medication after the operation to dissolve gallstones.
1. **Biliopancreatic diversion (BPD).** In this more complicated combined operation, the lower portion of the stomach is removed (see figure 5). The small pouch that remains is connected directly to the final segment of the small intestine, completely bypassing the duodenum and the jejunum. Although this procedure leads to weight loss, it is used less often than other types of operations because of the high risk for nutritional deficiencies. A variation of BPD includes a “duodenal switch” (see figure 6), which leaves a larger portion of the stomach intact, including the pyloric valve that regulates the release of stomach contents into the small intestine. It also keeps a small part of the duodenum in the digestive pathway. The larger stomach allows patients to eat more after the surgery than patients who have other types of procedures.

**Advantages:** Most patients lose weight quickly and continue to lose for 18 to 24 months after the procedure. With the Roux-en-Y gastric bypass, many patients maintain a weight loss of 60 to 70 percent of their excess weight for 10 years or more. With BPD, most studies report an average weight loss of 75 to 80 percent of excess weight. Because combined operations result in greater weight loss than restrictive operations, they may also be more effective in improving the health problems associated with severe obesity, such as hypertension, sleep apnea, type 2 diabetes, and osteoarthritis.

**Disadvantages:** Combined procedures are more difficult to perform than the restrictive procedures. They are also more likely to result in long-term nutritional deficiencies. This is because the operation causes food to bypass the duodenum and jejunum, where most iron and calcium are absorbed. Menstruating women may develop anemia because not enough vitamin B12 and iron are absorbed. Decreased absorption of calcium may also bring on osteoporosis and related bone diseases. Patients must take nutritional supplements that usually prevent these deficiencies. Patients who have the biliopancreatic diversion procedure must also take fat-soluble vitamins A, D, E, and K supplements, and require life-long use of special foods and medications.

RGB and BPD operations may also cause “dumping syndrome,” an unpleasant reaction that can occur after a meal high in simple carbohydrates, which contain sugars that are rapidly absorbed by the body. Stomach contents move too quickly through the small intestine, causing symptoms such as nausea, bloating,
abdominal pain, weakness, sweating, faintness, and sometimes diarrhea after eating. Because the duodenal switch operation keeps the pyloric valve intact, it may reduce the likelihood of dumping syndrome.

**Risks:** In addition to risks associated with restrictive procedures such as infection, combined operations are more likely to lead to complications. The risk of death associated with these types of procedures is lower for the gastric bypass (less than 1 percent of patients) than for the biliopancreatic diversion with duodenal switch (2.5 to 5 percent). Combined operations carry a greater risk than restrictive operations for abdominal hernias (up to 28 percent), which require a follow-up operation to correct. The risk of hernia, however, is lower (about 3 percent) when laparoscopic techniques are used.

In laparoscopy, the surgeon makes one or more small incisions through which slender surgical instruments are passed. This technique eliminates the need for a large incision and creates less tissue damage. Patients who are super-obese (more than 350 pounds) or have had previous abdominal operations may not be good candidates for laparoscopy, however. Adjustable gastric banding is routinely performed via laparoscopy.

This technique is often used for Roux-en-Y gastric bypass, and although less common, biliopancreatic diversion can also be performed laparoscopically. The small incisions result in less blood loss, shorter hospitalization, a faster recovery, and fewer complications than open operations. However, combined laparoscopic procedures are more difficult to perform than open procedures and can create serious problems if done incorrectly.

With rates of overweight among youth on the rise, bariatric surgery is sometimes considered as a treatment option for adolescents who are severely overweight. However, there are many concerns about the long-term effects of this type of operation on adolescents’ developing bodies and minds. Experts in pediatric overweight and bariatric surgery recommend that surgical treatment only be considered when adolescents have tried for at least 6 months to lose weight and have not been successful. Candidates should be severely overweight (BMI of 40 or more), have reached their adult height (usually 13 or older for girls, 15 or older for boys), and have serious weight-related health problems such as type 2 diabetes or heart disease. In addition, potential patients and their parents should be evaluated to see how emotionally prepared they are for the operation and the lifestyle changes they will need to make. Patients should also be referred to a team of experts in adolescent medicine and bariatric surgery who are qualified to meet their unique needs.
Prevention of Overweight and Obesity

Prevention of overweight and obesity is as important as treatment. Prevention includes primary prevention of overweight or obesity itself, secondary prevention or avoidance of weight regain following weight loss, and prevention of further weight increases in obese individuals unable to lose weight.

National and international observational data suggest that environmental and behavioral factors are likely to be important in the tendency of individuals within and between populations to be obese during childhood or to gain weight progressively with age during adulthood. These factors are also influenced by the genetic makeup of individuals. There has been a paucity of intervention research to demonstrate how these factors can be manipulated to prevent obesity. In two community studies, namely the Minnesota Heart Health Program and the Stanford Five City Study, multifaceted weight loss and weight control programs within the community were not associated with prevention of weight gain in longitudinally followed cohorts. In another community study, the Pawtucket Heart Health Program, BMI levels did not change in the intervention cities while they increased in the comparison cities. One obesity prevention study of American Indian children who are at high risk of becoming obese is under way.

Otherwise, the only long-term report suggesting an effective approach to obesity prevention is from follow-up of obese children in an experimental study in which they had been treated with or without a family-oriented treatment program. Long-term follow-up (10 years) of these children supported the importance of family involvement in reducing the progression of obesity.

One population-based randomized controlled pilot study of obesity prevention suggests that programs for weight gain prevention are feasible and effective in adults. Another study in China has shown that the prevention of weight gain through diet, physical activity, and their combination can help prevent diabetes. It has been suggested that primary prevention of obesity should include environmentally based strategies that address major societal contributors to over-consumption of calories and inadequate physical activity such as food marketing practices, transportation patterns, and lack of opportunities for physical activity during the workday. People at lower socioeconomic levels living in urban areas also lack access to physical activity sites. Such strategies will be essential for effective and long-term prevention of obesity for large numbers of individuals and for the community at large.

Research is needed to clarify the role of societal policies, procedures, laws, and other factors that serve as disincentives to lifelong caloric balance. The importance of obesity prevention needs to be brought to the attention of health care payors and practitioners, employers, educators, and public officials as an important priority to be addressed in policies, programs, and direct services to individuals and families. The development and implementation of appropriate...
policies and programs will require outcomes research that identifies effective weight gain prevention approaches. These programs must be useful for multiple settings, including health care facilities, schools, worksites, community and religious institutions, and be applicable to a broad population. In the end, efforts should be made to make the general public more aware of the need to prevent overweight and obesity.

Efforts to understand the genetic, developmental, environmental, and behavioral underpinnings of obesity and to mount successful prevention strategies are particularly critical for populations in which overweight and obesity and related health problems such as diabetes are disproportionately prevalent; for example, women in lower socioeconomic groups and women and sometimes men in many racial/ethnic minority populations.

Public health approaches for preventing obesity, that is, approaches designed to reduce the difficulty for any given individual of adopting healthful eating and activity patterns, will particularly benefit the socially disadvantaged, who—compared to the more advantaged—may have less access to preventive health services and fewer feasible options for making changes in their daily routines and lifestyles.

Primary care practitioners are an important element in preventing and managing obesity in the United States. Prevention of overweight and obesity in primary care settings is compatible with efforts to prevent their health consequences, through control of dyslipidemia, high blood pressure, and type 2 diabetes. Thus, both the quality and quantity of life may be enhanced through preventive strategies.

Strategies for Providing Optimal Care to Overweight Patients

Health care providers can take steps to overcome barriers to ensure optimal medical care of patients who are obese. Optimal care begins with educating staff about treating patients with respect. Having appropriate equipment and supplies on hand further increases patient access to care. Weighing patients privately and only when necessary may help overcome their reluctance to seek out medical services. Offering preventive services, in addition to monitoring and treating ongoing medical conditions, helps ensure that obese patients receive the same level of care as non-obese patients. Finally, providers should encourage healthy behaviors and self-acceptance even in the absence of weight loss. Using the following checklist can improve patient care in your office.

Create an accessible and comfortable office environment.
- Provide sturdy, armless chairs and high, firm sofas in waiting rooms.
- Provide sturdy, wide examination tables that are bolted to the floor to prevent tipping.
• Provide extra-large examination gowns.

Use medical equipment that can accurately assess patients who are obese.
• Use large adult blood pressure cuffs or thigh cuffs on patients with an upper-arm circumference greater than 34 cm.
• Have a weight scale with adequate capacity (greater than 350 pounds) for obese patients.

Reduce patient fears about weight.
• Weigh patients only when medically appropriate.
• Weigh patients in a private area.
• Record weight without comments.
• Ask patients if they wish to discuss their weight or health.
• Avoid using the term obesity. Your patients may be more comfortable with terms such as "difficulties with weight" or "being overweight."

Encourage healthy behaviors.
• Discuss weight loss—as little as 5 to 10 percent of body weight—as a treatment for weight-related medical conditions.
• Emphasize healthy behaviors to prevent further weight gain, whether or not the patient is able or willing to lose weight.
• Encourage physical activity to improve cardiovascular health.
• Seek out professional resources to assist your patients and provide referrals to registered dietitians, certified diabetes educators, exercise physiologists, weight management programs, and support groups, as appropriate.
• Promote self-acceptance and encourage patients to lead a full and active life.

Providing optimal medical care to patients who are obese may be challenging. Changes that foster a supportive and accessible environment for the patient, however, are within reach of most health care providers and can go far to overcome both patient and provider barriers to care.
Obesity

Resources

National Heart, Lung, and Blood Institute
Health Information Network
P.O. Box 30105
Bethesda, MD 20824-0105
(301) 592-8573
FAX (301) 592-8565

American Dietetic Association
216 West Jackson Boulevard
Chicago, IL 60606-6995
1-800-877-1600
FAX: (312) 899-1979
http://www.eatright.org

National Institute of Diabetes and Digestive and Kidney Diseases
31 Center Drive, MSC-2560
Building 31, Room 9A-04
Bethesda, MD 20892-2560
(301) 496-3583
FAX: (301) 496-7422

WIN - The Weight-Control Information Network
National Institute of Diabetes and Digestive and Kidney Diseases
1 WIN WAY
Bethesda, MD 20892-3665
(301) 570-2177
1-800-WIN-8098
FAX: (301) 570-2186

National Digestive Diseases Information Clearinghouse (NIDDK)
2 Information Way
Bethesda, MD 20892-3570
(301) 654-3810
FAX: (301) 907-8906

National Cancer Institute
Office of Cancer Communications
9000 Rockville Pike
Building 31, Room 10A-24
Bethesda, MD 20892
1-800-4-CANCER (800-422-6237)
http://www.nci.nih.gov

Eating Disorders Awareness and Prevention, Inc.
603 Stewart Street, Suite 803
Seattle, WA 98101
(206) 382-3587
http://www.edap.org/

American Anorexia/Bulimia Association, Inc.
165 West 46th Street #1108
New York, NY 10036
(212) 575-6200
http://www.aabainc.org

North American Association of the Study of Obesity (NAASO)
8630 Fenton Street
Suite 412
Silver Spring, MD 20910
(301) 563-6526
Fax: (301) 587-2365
http://www.naaso.org
Appendix A
Body Mass Index Table

To use the table, find the appropriate height in the left-hand column labeled Height. Move across to a given weight. The number at the top of the column is the BMI at that height and weight. Pounds have been rounded off.

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Obesity

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Obesity

Post-Test

1. What percentage of adults in the U.S. are currently classified as being overweight or obese (BMI of 25 or higher)?
   A. 16.8%
   B. 39.2%
   C. 54.9%
   D. 66.4%

2. The prevalence of hypertension in men with a BMI of 30 or greater is ___.
   A. 16.5%
   B. 18.2%
   C. 32.2%
   D. 38.4%

3. The BMI for someone who is 5’6” tall and weighs 180 lbs is ___. This individual would be classified as ___.
   A. 18.6, normal
   B. 29.9, overweight
   C. 31.2, class I obese
   D. 35.6, class II obese

4. Which of the following is NOT a cardiovascular risk factor that is used to classify high absolute risk?
   A. Hypertension
   B. Low LDL
   C. Type 2 Diabetes
   D. Family history of premature CHD

5. Approximately, what percentage of obese individuals suffer from binge eating?
   A. 20%-30%
   B. 30%-40%
   C. 40%-50%
   D. 50%-60%

6. Which of the following is NOT one of the proven behavior modification techniques?
   A. Self-monitoring
   B. Rewards
   C. Stimulus control
   D. Negative reinforcement
Obesity

7. An ideal weight reduction diet is one that creates a deficit of ___ per day, and achieves a weight loss of ___ per week.
   A. 250-500 Kcal, 1-2 pounds
   B. 500-1000 Kcal, 1-2 pounds
   C. 750-1250 Kcal, 2-3 pounds
   D. 1000-1500 Kcal, 2-3 pounds

8. Which of the following is categorized as a moderate physical activity?
   A. Cooking
   B. Recreational table tennis
   C. Walking a 15-minute mile
   D. Basketball

9. Which of the following is an appetite suppressant that has been approved for long-term use?
   A. Xenical
   B. Phentermine
   C. Sibutramine
   D. Bontril

10. _______ is the most common and successful combined bariatric surgery performed in the United States.
    A. Roux-en-Y Gastric Bypass (RGB)
    B. Bilipancreatic Diversion (BPD)
    C. Adjustable Gastric Banding (AGB)
    D. Vertical Banded Gastroplasty (VBG)