

Current Scenario of Body-Fat Loss and Weight Control

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Abstract

People participating in weight-loss programs that include both a lower-calorie eating plan and exercise can expect to lose about 5-11 kg over 6 months, at which time weight loss generally plateaus. For most, this translates to the recommendation to lose 5–10% of body weight for health benefit. However; this is often less than patients expect to lose when initiating a weight-loss program. Patients typically expect a weight loss of two to three times what is recommended or expected upon entering treatment. Even when patients are advised about what to expect, they still anticipate an unrealistic weight loss. Do such expectations affect treatment outcomes? The common assumption is that unrealistic expectations inhibit program effectiveness, that they are psychologically damaging, and, thus, they should be discouraged by practitioners. These assertions do not seem to hold up, however, in weight-loss research. At least six trials have prospectively examined the association between weight-loss goals, dream weights, and actual weight loss. In terms of weight loss, most actually found a positive benefit to unrealistically large weight-loss goals and thin dream weights. No study observed a negative association between these factors. Patients can expect to lose about 5-11 kg when they eat less, exercise more, and consistently maintain those behaviors over 6 months. This amount is much less than most patients desire, but what they desire seems to matter little in terms of the weight-loss results. Diabetes educators should inform their patients about typical weight-loss results (i.e., what they can expect to lose), but in most cases, do not need to be overly concerned if expectations are unrealistically high. That being said, the ongoing focus of weight-management goals should be on desired behaviors, which are under more immediate control relative to weight loss.

Most people believe that protein increases satiety at a meal, which can result in lower caloric intake and thus weight loss. There is very limited research in this area, however. One study found that eating foods high in protein and fiber, as well as foods with greater water/volume (which leads to lower energy density) may be effective in delaying the return of hunger. Studies evaluating bound-water loss when following a high-protein diet have produced inconsistent results and concluded that protein satiety might actually play a more important role during weight loss than the reduction of total body water.

Although subjects report feeling more satisfied after eating protein, this does not always translate into eating fewer calories. One of the studies reported that, although subjective hunger was less after a high-protein breakfast compared to a high-fat or high-carbohydrate breakfast, lunch intake 5 hours later and energy intake for the rest of the day were similar after all three breakfasts. Currently, research on satiety is generally very

short term, and the effect of satiety on future caloric intake is rarely studied.

Causes of Obesity

- ❧ high blood pressure and hypertension,
- ❧ high blood cholesterol and dyslipidemia,
- ❧ type 2 (non-insulin-dependent) diabetes,
- ❧ insulin resistance and glucose intolerance
- ❧ hyperinsulinemia,
- ❧ coronary heart disease,
- ❧ angina pectoris
- ❧ congestive heart failure,
- ❧ stroke,
- ❧ gallstones
- ❧ cholecystitis and cholelithiasis,
- ❧ osteoarthritis,
- ❧ obstructive sleep apnea and respiratory problems
- ❧ Some types of cancer (such as endometrial breast, prostate, and colon),
- ❧ complications of pregnancy,
- ❧ poor female reproductive health (such as menstrual irregularities, infertility, irregular ovulation),
- ❧ bladder control problems (such as stress incontinence)
- ❧ uric acid nephrolithiasis, and
- ❧ psychological disorders (such as depression, eating disorders, distorted body image, and low self-esteem)

The greater the degree of Obesity, the more likely and more serious the preceding health problems become. In addition poor nutrition and physical inactivity account for some 300,000 premature deaths in united state each year.

Then death rate for obese men ages 15 to 69 is 50% higher than that of normal – weight persons and 30% higher that of people classified as merely overweight. Estimates are that every 10% increment above normal weight reduces life span by 1 year. Moreover, the quality of life declines dramatically in obese individuals.

This Chapter examines the critical aspects of weight control: causes of obesity, assessment, safe Wight-loss methods. The Role of exercise in weight and fat management, underweight and eating disorders, and the role of behavior – modification techniques in helping young people manage body weight and fat during the late teenage and early adult years.

Causes of Obesity

According to the Centers for Disease Control (CDC), numerous factors influence overweight and obesity, including the following:

- ❧ Behavior-eating too many calories while not getting enough physical activity will lead to over- weight or obesity.
- ❧ Environment--home, work, school, or community can provide barriers to or opportunities for an active lifestyle.
- ❧ Genetics-heredity plays a large role in determining how susceptible people are to overweight and obesity. Genes also influence how the body burns calories for energy or stores fat.

The CDC also indicated that behavioral and environmental factors are the main contributors to overweight and obesity and provide the greatest opportunities for prevention and treatment.

Inactivity and overeating are clearly two major causes of obesity and over fatness. Studies show that children are spending more time watching TV, using computers, and playing video games. The proximity and availability of food and the limited time devoted to free play and exercise are producing a nation of over fat and obese youth, who will eventually become over fat and obese adults. The problem is complex. Researchers have identified many additional factors that play a role in both the prevention and treatment of obesity, such as those discussed in the following sections.

Early Eating Patterns

Most experts agree that the eating habits formed in infancy and childhood carry over into the adult years. Rats exposed to unlimited milk, for example, continue to eat more and exercise less after they are weaned than rats that receive only limited milk. In other words, rats that are overfed before weaning become sedentary adult rats that overeat, become fat, and suffer from early cardio respiratory disease. In contrast, rats that eat less before weaning continue to eat less, exercise more, live longer, and experience less cardio respiratory disease. The response in humans is similar. Children who are inactive and who overeat are also more likely to continue those behaviors later in life and become over fat adults. Environmental forces appear to influence eating patterns more than physiological forces such as hunger do. Negative eating behavior may begin in infancy. Some experts feel that bottle feeding, for example, may predispose infants to obesity. Bottle-fed babies are approximately three times more likely to be over fat than breast-fed babies are. Bottle feeding fails to provide the solace of breast feeding and tends to produce anxiety, which may provoke overeating.

Breastfed babies also learn to stop feeding when the richest portion of the milk gives way to more watery milk. The bottle does not provide this natural mechanism, more calories to satisfy their hunger.

Perhaps a more important problem is feeding babies solid foods too early, which may contribute to the production of excess fat cells. Experts recommend that parents start feeding their infants solid foods at the age of 5 months rather than earlier, except for cases of very large or fast developing babies. Following this recommendation is not easy for sleep-deprived mothers who long for the day the baby sleeps through the night without waking for a feeding.

Growing children are unlikely to be obese if they themselves decide when to stop eating at a meal. Forcing children to clean the plate is a mistake. This practice forces them to overeat. Making sweets plentiful, using them as rewards, and celebrating the fat baby compound the problem, shorten the life span, encourage premature heart disease, create undesirable eating habits, and destine the child to a life of restricted eating because of the high number of fat cells formed in early life. A lean child with a great deal of energy and vitality is healthier and more likely to be healthy later in life.

At no stage in life is excess fat desirable; however, the earlier in life a child is obese, the greater the chance that the child will eventually be of normal weight. The later in life a child is obese, the less likely it is that he or she will ever return to normal weight. An obese adolescent, for example, has approximately in 16 chance of returning to normal weight as an adult. The fatter a person is at any age, the less likely it is that he or she will

ever return to normal weight. Parents should therefore start children off right and avoid over feeding them. If children's mechanism for pushing up from the table when they so bottle-fed babies require are full is undermined, they plenty of real push-ups in their adult years to are certain to need control weight.

Genetics

The genes we inherit influence our body weight and the amount and disposition of fat. Children of over fat or obese parents, particularly the biological mother, are much more likely to develop weight problems. Twin studies also support the influence of genetics on over fatness and obesity. Heredity may link to weight and fat problems in a number of other ways, such as predisposition to consuming sweet, high-fat foods; impaired hormonal functions (insulin and cortisol); lower basal metabolic rate; differences in calories used during the metabolism of food; inability of nutrients to suppress the appetite control center; differences in the ability to store fat and burn calories during light exercise; and the tendency to develop more fat cells. Ongoing research on the presence of a so-called fat gene and the development of drugs to control hunger permanently offer hope for overweight individuals in the future. Keep in mind, however, that environment is still critical. Genetics merely predispose individuals or provide them with the tendency to become fat-a problem that regular exercise and proper nutrition can help overcome.

Role of the Stomach

Scientists have been trying to determine why it is so much easier for most people to lose weight than it is to keep it off. New evidence suggests that it is the stomach, rather than the brain, that causes people to eat more and regain lost weight. Levels of the appetite boosting hormone ghrelin (*Ghrelin is a hormone that is produced and released mainly by the stomach with small amounts also released by the small intestine, pancreas and brain. Ghrelin has numerous functions. It is termed the 'hunger hormone' because it stimulates appetite, increases food intake and promotes fat storage.*), secreted by the stomach, rise significantly in dieters after they lose weight and drop in those who have undergone stomach reducing procedures such as gastric bypass. Although cells in the small intestine produce small amounts of ghrelin, the stomach manufactures most of the hormone. The more weight dieters lose, the higher their level of ghrelin. Levels of ghrelin are also higher just before dieters lose weight.

Researchers feel that a drug capable of blocking the action of ghrelin would help people both lose weight and keep it off. The hormone may also provide help in gaining weight to those who have lost excessive amounts because of cancer, AIDS, anorexia nervosa, bulimia, or other conditions.

Metabolic Factors

Even small changes in metabolic rate translate into large increases in body fat and weight. A 10% decline in metabolism, for example, could result in an annual weight gain of about 8 kg for the average individual. Aerobic exercise increases metabolic rate both during and after the exercise session. The after burn continues for 20 minutes to several hours, depending on the duration and intensity of the workout. Coffee, tea, cocoa, colas, other caffeine-containing foods and drinks, and amphetamines and other drugs increase metabolic rate. In mid afternoon, metabolism tends to slow, making this an excellent time to perform aerobic exercise that will boost metabolic rate.

Environmental Factors

Although heredity plays an important role, environment is also critical. Sound exercise

and eating and drinking habits can overcome the genetic tendency to be either thin or fat. One of the clearer causes of obesity and over fatness in children is watching television. People on television programs eat about eight times per hour, and commercials generally advertise high-calorie, high-fat foods. Television watchers notice these cues and tend to eat more often and consume more high-fat, high-calorie foods. In addition, television watching is a passive activity. Almost any activity will burn more calories than watching television does. Although restricting the number of television-watching hours for all children and teenagers is a good idea, it is critical to do so for the over fat child.

Other environmental influences, such as eating and exercise habits of parents, food availability, and nutritional knowledge, may not be as important as was once believed. Experts feel that genetic influences account for about 70% of the differences in body-mass index (BMI) that occur later in life and that childhood environment has less influence than was once thought. Still, the environment has an influence on obesity. Non genetic factors are important determinants of body fat. These factors are reversible and capable of overcoming some of the genetic factors that make us fat.

Weight Loss versus Fat Loss

Weight loss and the loss of body fat are not the same. Losing weight is much easier than shrinking fat cells. A typical diet producing a 4.5-kg weight loss that does not involve aerobic exercise and strength training may result in fat loss of only 3 or 4 kg and a loss of 1 to 2 kg of lean-muscle tissue. Obviously, the ideal program would produce a 5kg loss of body fat because losing any amount of lean-muscle tissue is undesirable. Fad diets, any diet without exercise, and rapid weight loss of more than 1/5 to 1kg per week are likely to result in considerable loss of lean-muscle mass. The problem is compounded by the fact that most of the lost weight that is regained is fat, not muscle. The result is less muscle mass and a slowing of resting metabolism, which accounts for the majority of daily calories burned. For many who engage in unsound diet practices, each cycle of losing and regaining 4 kg increases the percentage of body fat and the ratio of fat to muscle. This chapter focuses on sound concepts and principles that safely and effectively control both body fat and body weight.

Safe Weight-Loss Procedures

Losing weight incorrectly can be dangerous. Read this section carefully and avoid beginning any fad or unfounded diet that promises miraculous results in just days or weeks. Consult your physician about a safe, effective diet and exercise plan that fits your lifestyle and current health status.

Hunger and Appetite

Hunger is generally considered physiological, an inborn instinct, whereas appetite is a psychological, or a learned, response. This difference helps explain why it is so common to have an appetite and eat when you are not hungry; conversely, some very thin people or those with eating disorders may experience hunger without appetite. Hunger is an active experience, whereas appetite is passive.

Satiety

The feeling of fullness or satisfaction that prompts us to stop eating is called satiety, one of the key regulators of eating behavior. Some experts feel that eating behavior is always in operation except when the satiety signal turns it off. Just how that happens is unknown, although a number of theories have been advanced. The glucostatic theory of hunger regulation suggests that blood glucose levels and the exhaustion of liver glycogen may

account for the starting and stopping of eating.

The liver stores about 75 grams of glycogen, or more than 300 energy units (calories). When liver glycogen levels fall significantly, feelings of hunger may occur. The lipostatic theory suggests that the number of fat-storing enzymes on the surfaces of fat cells regulates hunger in some way. The message that the cells send to the brain in this theory has not been identified. The purinegic theory is relatively new and untested and proposes that the circulating levels of purines, molecules found in DNA and RNA, govern hunger: Exactly where and how the brain receives these messages is also unknown. The hypothalamus gland appears to be important in regulating eating and satiety. Damage to this area can produce eating disorders and severe weight loss or gain.

Other factors seem to influence satiety as well. Hormones secreted by the pancreas when blood glucose levels rise too high (insulin) or drop too low (glucagons) also affect satiety and the desire to eat. Ingesting too many simple carbohydrates at one time by eating a candy bar, for example, will rapidly elevate blood-sugar levels and produce an insulin response that eventually drops blood glucose below normal levels, a condition sometimes referred to as bonking. The faster the rate of entry of simple carbohydrates, the greater the release of insulin. Too much insulin is also responsible for driving sugar to the muscles and liver for storage as glycogen, amino acid to muscles, and fat to adipose tissue for storage. Rapid changes in blood-glucose levels produced by ingesting large amounts of concentrated sugars may be part of the puzzle that affects both satiety and energy levels. Although the premise is not scientifically proven, some experts feel that the ratio of dietary carbohydrates to protein controls the relative levels of insulin to glucagon every time one eats and helps maintain satiety. A sample meal may involve carbohydrate intake that contains no more than twice the calories as the protein consumed. Such a meal may contain 20% of calories from protein and no more than 40% from complex carbohydrates (fruits, vegetables, grains). Simple carbohydrates are kept to a minimum. This approach does increase the previously recommended daily intake of protein of 12 to 15% of calories to 20% and reduces complex carbohydrate intake from 45 to 40%. Avoiding anything but small amounts of simple carbohydrates in the form of concentrated sugars and increasing protein intake slightly can help prevent extreme fluctuations in blood-glucose levels that commonly occur during the day and help control your appetite by aiding satiety.

Still other hormones, such as endorphins, the body's natural painkillers, and cortisol may affect satiety. Blood concentrations of digestive hormones such as cholecystinin (CCK), secretin, gastrin, and others increase and combine with stomach distention to help control hunger.

Eating behavior appears to occur in response to numerous signals. The possibility also exists that an inherited, internal regulatory defect is at least partially responsible for obesity, rather than its being a purely learned behavior or genetically caused.

Obviously, we have much to learn about the causes of obesity. Experts propose many other theories. Understanding the difference between hunger and appetite and the factors suspected of controlling food intake will help you control your body weight and fat.

Hunger - *A physiological response of the body indicating a need for food involving unpleasant sensations.*

Appetite - *The desire to eat; pleasant sensations aroused by thoughts of the taste and enjoyment of food.*

Satiety - A state in which there is no longer a desire to eat.

glucostatic theory - A theory about hunger regulation suggesting that blood-glucose levels determine whether one is hungry or satiated through the exhaustion of liver glycogen.

lipostatic theory - A theory about hunger control suggesting that the size of fat stores signals us to eat

purinegic theory - A theory about hunger suggesting that the circulating levels of purines, molecules found in DNA and RNA, govern hunger.

hypothalamus gland - A portion of the brain that regulates body temperature and other functions; thought to be important in the regulation of food intake.

Drugs and Weight Loss

The search continues for a safe, effective drug, free of undesirable side effects and potential for abuse, to aid in reducing body fat. Appetite-suppressant drugs (stimulants) such as Dexedrine and Benzedrine reduce appetite for only a short time, and most users quickly develop tolerance to the drugs. These drugs can also be addictive and cause nervousness, dizziness, weakness, fatigue, and insomnia. The FDA has approved two other over-the-counter appetite-suppressant ingredients. New drugs or agents such as phentermine that increase energy metabolism by mimicking the effects of moderate exercise in obese people and helping the body use more fat as fuel are also being tested. Fiber pills, diuretics (water pills), and a host of other diet aids with so-called magic ingredients such as spirulina, ephedrine, inositol, chromium picolinate, and ginseng are currently available. Unfortunately, not one has been shown to be an effective weight-loss aid. For example, chromium picolinate, one of the more popular ingredients, allegedly reduces fat, builds lean-muscle mass, suppresses appetite, and increases metabolism, but no evidence supports these claims. In September 1997 the FDA requested the removal of the drugs fenfluramine, sold as Pondimin, and dexfenfluramine, sold as Redux. Prescription medications may aid weight loss when you work with your physician or dietitian and combine medication with diet control, modifying problem behaviors, and increasing physical activity. Using over-the-counter weight-loss drugs without the supervision of a physician should be avoided because such drugs are ineffective and unsafe.

Calorie Counting

If you are over fat according to the guidelines in this chapter, you may want to consider an exercise and diet regimen to lose body fat and weight. When you set goals for body-fat loss, you can expect to lose about .5 millimeters of body fat per week with an appropriate combination of diet and exercise. For example, if you are now classified as above-average fat, you can realistically expect to reach the average-fat category after a 10-week program. These figures will help you decide how much to increase your daily energy expenditure and how much to reduce your daily caloric intake to meet your weight- and fat-loss goals. You can then reduce your caloric intake and increase your exercise expenditure to produce slow, safe weight and fat loss.

Cutting back on sugar and refined carbohydrates

The Western diet is increasingly high in added sugars, and this has definite links to obesity, even when the sugar occurs in beverages rather than food.

Refined carbohydrates are heavily processed foods that no longer contain fiber and other nutrients. These include white rice, bread, and pasta.

These foods are quick to digest, and they convert to glucose rapidly.

Excess glucose enters the blood and provokes the hormone insulin, which promotes fat storage in the adipose tissue. This contributes to weight gain.

Where possible, people should swap processed and sugary foods for more healthful options. Good food swaps include:

- 🔗 whole-grain rice, bread, and pasta instead of the white versions
- 🔗 fruit, nuts, and seeds instead of high-sugar snacks
- 🔗 herb teas and fruit-infused water instead of high-sugar sodas
- 🔗 smoothies with water or milk instead of fruit juice

Eating plenty of fiber

Dietary fiber describes plant-based carbohydrates that it is not possible to digest in the small intestine, unlike sugar and starch. Including plenty of fiber in the diet can increase the feeling of fullness, potentially leading to weight loss.

Fiber-rich foods include:

- 🔗 whole-grain breakfast cereals, whole-wheat pasta, whole-grain bread, oats, barley, fruit and vegetables
- 🔗 peas, beans, and pulses
- 🔗 nuts and seeds

Balancing gut bacteria

How Exercise Helps One emerging area of research is focusing on the role of bacteria in the gut on weight management. The human gut hosts a vast number and variety of microorganisms, including around every individual has different varieties and amounts of bacteria in their gut. Some types can increase the amount of energy that the person harvests from food, leading to fat deposition and weight gain. Some foods can increase the number of good bacteria in the gut, including:

- 🔗 **A wide variety of plants:** Increasing the number of fruits, vegetables, and grains in the diet will result in an increased fiber uptake and a more diverse set of gut bacteria. People should try to ensure that vegetables and other plant-based foods comprise 75 percent of their meal.
- 🔗 **Fermented foods:** These enhance the function of good bacteria while inhibiting the growth of bad bacteria. Sauerkraut, kimchi, kefir, yogurt, tempeh, and miso all contain good amounts of probiotics, which help to increase good bacteria.
- 🔗 **Prebiotic foods:** These stimulate the growth and activity of some of the good bacteria that aid weight control. Prebiotic fiber occurs in many fruits and vegetables, especially chicory root, artichoke, onion, garlic, asparagus, leeks, banana, and avocado. It is also in grains, such as oats and barley.

Pleasant side effects that often accompany weight loss of more than 5 to 10 pounds are an enhanced self-concept and an increased energy level. Remember that the weight you choose as a target is one that, once reached you must maintain for the rest of your life. The acceptance of a healthy lifestyle, not just weight loss per se, is what will most likely keep your thin self going in the future. Regular vigorous exercise is an essential part of this healthy, holistic lifestyle. In 2001 the American College of Sports Medicine issued a position statement on appropriate intervention strategies for weight loss and prevention of

weight regain for adults. Overall, they contend that if you expect to lose body fat and weight and then maintain that lower level, you need both to restrict your caloric intake and to engage in regular exercise. By remaining physically active, you will be able to consume more calories daily. The alternative is to remain mildly hungry most of your life. This formula for weight-loss maintenance seems simple, yet the fact that most people desire to control their weight but remain unsuccessful at maintaining body-fat losses for more than a few months addresses the complexity of the problem. Among individuals with a lower level of education, studies have shown that few were using these recommended strategies for losing and maintaining weight. The promotion of increased physical activity coupled with healthy eating habits should be a primary educational goal among high school students of all ethnicities because the 1999 National Youth Risk Behavior Survey reported that adolescents may prefer to use tobacco as a form of weight control, which adds to long-term cardiovascular risks (Lowry et al., 2002). The key to weight loss through exercise is volume, not intensity. Longer, slower walks, jogs, and exercise sessions will burn more calories than shorter workouts. Secretary of Health and Human Services Tommy Thompson is applying this concept with his staff to attack the obesity epidemic by handing out small step counters and encouraging people to take 10,000 steps daily, a figure that researchers indicate is needed to control body weight (Mulrine 2003). With the average walking step from the tip of the back toe to the tip of the front toe in normal work activity at about 18 to 20 inches (except when walking at the recommended 4 mph or 15-minute mile pace), this amounts to approximately three miles per day. This would be considered close to the minimum steps and distance one should cover to help control weight. Numerous scientific studies have been conducted to identify perceived barriers associated with weight loss and weight-loss maintenance among high-risk populations. Results revealed that some of the perceived barriers for weight loss and weight-loss maintenance among racially and ethnically diverse women include

- ❧ lack of programs addressing the women's concerns,
- ❧ traditional ethnic cooking and eating patterns,
- ❧ cultural acceptance of a larger body type and less negative views toward overweight individuals among African American and Hispanic women,
- ❧ occupational and personal stress,
- ❧ Lack of social support, and dietary readiness to lose weight.

One major reason for attrition from weight-loss maintenance programs is lack of motivation after termination of an organized program. We have also learned that many individuals are more likely to maintain exercise programs when they self-select the activity. Additionally, several studies show that follow-up classes that reinforce diet and exercise behavior modification are effective in maintaining long-term weight-loss outcomes. Many other reasons support the inclusion of both diet and exercise in a weight-loss or weight-management program.

Exercise Depresses Appetite and Improves Satiety

Regular exercise not only helps control hunger but also improves satiety by making you feel full with less food. As you continue to exercise four to five times each week and consume fewer calories your stomach will shrink in size until only about 3 cups of food will cause you to feel full or satisfied instead of the normal four cups. By exercising regularly and avoiding meal skipping, you keep from becoming too hungry, a major cause of overeating in one sitting that eventually will increase your stomach size.

Combining exercise with calorie restriction helps reduce the amount of food and calories you eat to feel satisfied because the size of your stomach will decrease. The results are loss of body weight and fat and less difficulty in maintaining your new weight.

Exercise Increases the Number of Calories You Burn at Rest

Of all the calories you expend, you burn approximately 65 to 70% while in a resting state. The number of calories you use in a resting state is referred to as basal metabolism. Small changes in basal metabolism, such as those that occur following exercise, result in big changes in weight and fat loss. Both aerobic exercise and strength training will increase resting metabolism. Exercise burns calories both during the workout and for 20 minutes to several hours after exercise ceases (after burn) by keeping your metabolic rate above the normal resting baseline. A 3-mile jog or swim, for example, doesn't expend only the 200 or 300 calories burned during the activity; it also burns an additional 25 to 40 calories per hour for the next several hours. The total benefit of a 3-mile run, then, may be as high as 400 calories.

basal metabolism - The number of calories burned to maintain body functions while in a resting state.

Exercise Can Lower Your Set Point

According to the set-point theory, you possess an inborn computer-like mechanism that regulates energy balance and body weight and fat by modifying your caloric intake and expenditure. In other words, your body is programmed to be a certain weight (the set point). If you initiate a very low calorie diet in an attempt to deviate from this set point weight, your body will make metabolic changes (starvation response) to conserve energy, defend your current weight, and defeat the diet attempt. The theory may explain why some people maintain normal weight throughout life and others are unable to lose weight (because the body vigorously defends the set-point weight).

Regular aerobic exercise can adjust or reset your set-point weight to a new lower level. Physical activity produces a lower weight, less body fat, and a new energy balance. Your body now defends this lower set point, making it difficult for you to gain weight.

Exercise Burns a High Number of Calories and Increases Metabolic Rate

Although any amount of exercise is helpful, keep in mind that it is important to follow our exercise guidelines for weight loss presented in chapter 3, "Principles of Exercise." Evidence indicates that most people who exercise to lose weight do not exercise enough. According to a 1998 national survey by the Centers for Disease Control and Prevention, 62.7 % of overweight Americans were exercising for the purpose of losing weight, but only 28% said they exercised 30 minutes per day, 5 days per week. The average person walked three times weekly. A program that involves aerobic activity five times weekly for a minimum of 30 minutes for each workout plus two or three weight-training sessions to add muscle mass or at least prevent loss of lean-muscle mass will be much more effective. Some studies indicate that it takes a full hour per day of moderate exercise such as brisk walking to lose weight and body fat.

Strength-training programs involving weights add muscle mass and increase metabolism permanently. Keep in mind that fat is a dormant tissue that requires few calories to maintain. Muscle tissue, on the other hand, requires considerable calories to maintain. Estimates are that every pound of additional muscle increases the metabolic rate 30 to 40 calories per 24-hour period. If you add 5 pounds of muscle over a 6 month period, your

metabolic rate may increase by as much as 200 calories daily. This translates into about 6,000 calories monthly, or nearly 2 pounds of fat (2,500 calories equals 1 pound of fat). This change is obviously significant.

The best system for controlling body weight is changing your eating habits and beginning an exercise program you enjoy and are likely to continue throughout life. If you change your behavior in these two areas, you will go through life at your ideal body weight and fat. Complex forces carefully regulate body weight, but the formula for weight loss is simple. If you eat more calories than you burn through activity, a positive caloric balance will produce weight gain. If you burn up more calories than you eat, a negative caloric balance will cause weight and fat loss.

Walking, bicycling, swimming, dancing Jogging and other aerobic activities are all effective means of exercise for weight loss. Some types of physical activity and sports are relaxing and enjoyable. Other activities are superior in terms of weight loss and aerobic benefits.

When you choose a particular exercise program, consider the following:

- ❏ You are more likely to continue exercising in activities you enjoy.
- ❏ Activities that expend a moderately high number of calories per minute and allow you to continue exercise for 30 to 90 minutes are the best choices.
- ❏ Lifelong physical-recreational sports that provide heart-lung benefits are superior
- ❏ The choice you make should allow you to start at your present fitness level and progress to higher levels later.

Exercise Brings Needed Calcium to the Bones

Because of normal aging and weight loss, bones lose calcium and other minerals and become brittle. You need adequate calcium in your diet plus weight-bearing exercise (walking, jogging, running, aerobic dance) to increase the amount of calcium that reaches the bones and thereby helps prevent osteoporosis.

Exercise Changes the Way Your Body Handles Fats

Exercise helps lower and maintain serum cholesterol (LDL) and triglycerides. HDL (high-density lipoprotein, the good cholesterol) increases, and the ratio of HDL to total cholesterol improves. High HDL counts and a high ratio of HDL to total cholesterol (1 to 4 or higher) have been associated with a lower incidence of heart attacks.

Exercise Increases Fat Loss and Decreases the Loss of Lean-Muscle Tissue

Although weight-loss programs strive to reduce body fat, most also result in the loss of lean muscle tissue. This result is undesirable at any age because it reduces the number of calories you burn at rest, alters your appearance, and leaves you with less muscle to perform daily activities. Sound programs that combine exercise (aerobic activities and weight training) with reduced caloric intake not only prevent lean-muscle loss but also add muscle mass and increase resting metabolism. Although fat is a dormant tissue and maintained at rest with little energy expenditure, muscle tissue requires a considerable number of calories to maintain. For every pound of muscle mass you add, resting metabolic rate increases 30 to 34 calories per 24 hour period. Adding muscle weight is one of the most significant long-term ways exercise helps you lose and maintain a lower body weight and fat throughout life.

Regular Aerobic Exercise Increases Your Energy Level for Both Work and Play

The sound approaches to weight loss presented in this chapter allow you to consume enough calories to maintain an energy level that will allow you to exercise daily. Other typical low-calorie diets (fewer than 800 to 1,000 for women and 1,200 to 1,400 for men) put the body in a starvation mode of conserving calories by slowing your resting metabolic rate and robbing your energy and motivation to work out. You should consume a sufficient number of calories daily to prevent the body from adopting this starvation mode. Because you are then less likely to skip workouts, you will burn more calories, lose more fat and weight, and increase your energy level for work and play.

Exercise Will Improve Your Appearance and Self-Concept

Most people begin an exercise and weight-management program to look and feel better. An important part of the motivation to continue a lifetime approach to weight control is derived from your self-concept and how you feel about your body. Everyone has parts of their body that they are satisfied with and parts with which they are unsatisfied. Although weight and fat loss without the benefit of exercise will improve appearance in clothing, the loss of lean muscle tissue and large amounts of fatty tissue may result in a less firm body, skin that does not fit as well, and an appearance that fails to improve self-concept. The correct approach will improve your appearance by adding muscle mass and firmness, decreasing body fat, and improving the way skin fits in areas where you lost large amounts of fat deposits.

Exercise Provides a Wide Range of Health Benefits

Evidence continues to mount linking regular exercise to the prevention of various types of cancer, cardiovascular disease and stroke (lower LDL cholesterol and triglycerides; higher HDL cholesterol), osteoporosis (weight-bearing exercise such as walking, jogging, running, step aerobics, and aerobic dance brings needed dietary calcium to the bones), hypertension, and gall bladder problems (by preventing obesity). In addition, exercise contributes to an improved immune system, stress reduction, mental-emotional health, self-concept, and an improved sex life. Physically active individuals also live longer than the least physically active. Studies show that death rates increase as fitness levels decline. Another important benefit for the elderly is the evidence that weight training and flexibility training help people remain independent longer. Acts such as getting out of a chair or automobile, tying shoes, and walking become easier as strength and flexibility improve.

Underweight Conditions and Eating Disorders

The problems of gaining weight are just as complex as those associated with weight loss. Hunger, appetite, and satiety irregularities; psychological factors; metabolic problems-all can cause dangerous underweight. For those who need additional weight and muscle for sports or who merely want to be and appear stronger, gaining a pound is just as difficult as losing a pound is for others.

Gaining Weight

A drug-free program to gain muscle weight requires dedication to both diet and exercise.

With a sound approach, individuals strive to add no more than a half pound of muscle per week. This rate of gain is about as fast as the body can add lean-muscle tissue. Faster approaches involving too many calories are almost certain to add adipose tissue.

A sound strength-training program, such as weight training, is an absolute must for muscle weight gain. Training for several hours six times weekly, alternating muscle groups each workout may be necessary.

The nutritional support for a sound weight gain program involves

- ☞ An increase in food (about 400 to 500 additional calories daily) that provides high calories in a small volume to keep you from getting uncomfortably full,
- ☞ A slight increase in total protein intake (14 to 15% of daily calories), and
- ☞ A slight reduction in total fat intake (18 to 20% of daily calories).

Extra calories should come from complex carbohydrates (45 to 50% of daily calories) to provide long-term energy and for protein sparing. Most individuals who have difficulty gaining weight do not eat enough calories to support their vigorous workout schedule. Using protein or amino acid tablets is hazardous and a waste of money. In most cases, individuals already consume more protein than they need; adding more in the form of supplements is unnecessary.

Summary

Trends in Body-Fat Loss and Weight Control Over the past decade the percentage of obese individuals (children and adults) in the United States has steadily increased, continuing the trend of the previous decade. People of all ages are several pounds heavier than those of the previous decade were. Unfortunately, the increase comes because of additional body fat, not muscle.

Causes of Obesity Overfatness and obesity are caused by a number of factors, with both genetics and environment playing key roles. Although inheriting the tendency to become fat is a disadvantage, environment can overcome this predisposition. Inactivity and overeating are still the two major behaviors associated with weight and fat gain. The body appears to defend its biological weight, referred to as set point, by resisting attempts to lose weight. Lowering the set point requires regular aerobic exercise and reduced caloric intake for 6 to 12 months or until it is evident that the body is now defending the lower weight and fat levels.

Fat cells increase in number only until growth ceases, at which time one becomes fat only through the enlargement of existing adipose cells. Adults who become obese may develop some new fat cells. Small changes in metabolism result in large increases or decreases in weight over a period of 6 to 12 months. Only a small percentage of individuals with weight problems suffer from an underactive thyroid gland.

Levels of the appetite-boosting hormone ghrelin, secreted by the stomach, affect the hypothalamus gland and produce hunger, encourage eating, and increase fat storage. Researchers are searching for a drug that blocks the action of ghrelin to help people lose weight and keep it off.

The number of calories we burn at rest account for most of the calories expended in a 24-hour period. Inactivity and loss of muscle mass with aging lower one's metabolic rate and significantly contribute to excess stored fat and weight gain. Regular weight training that prevents loss of muscle tissue or adds more muscle

can produce the opposite effect and increase the number of calories burned in a resting state.

Adenovirus-36 is six times more likely to be present in the body of overweight humans than in those of normal weight. Researchers feel that the virus contributes to overweight and obesity by increasing number of fat cells and fat storage.

Body Composition *A number of methods are available to determine ideal body weight and percentage of body fat. Height-weight tables should be used only as a guide to ideal weight because they provide no indication of percentage of body fat, the key factor in determining health risks. By measuring the thickness of two layers of skin and the underlying fat, you can secure an estimate of total-body fat and identify ideal body weight. A number of different skin fold sites can be used. Electrical impedance and underwater weighing are more accurate techniques, but those methods require special equipment.*

Safe Weight-Loss Procedures *Hunger is a physiological, inborn instinct designed to control food intake, whereas appetite is a psychological, learned response. Although numerous theories have been advanced to explain how the body controls food intake, the exact signals that cue us to consume food have not been positively identified. Calories count, and the body handles the matter with computer-like precision, storing 1 pound of fat for every 3,500 excess calories consumed.*

Exercise is essential to the control of body weight and fat. Regular aerobic exercise depresses appetite, minimizes fat loss, maximizes the loss of lean-muscle tissue, burns a high number of calories, brings needed calcium to the bones, and changes the way body handles dietary fat.

Numerous new drugs designed to curb appetite, increase metabolic rate and exercise metabolism, deaden taste buds, and increase burning of fat as energy are being tested and evaluated. The search for the magic pill that will help everyone attain ideal weight and body fat continues. Even if researchers develop such a pill, people will need to use it in combination with a lifetime of sound nutrition and fitness practices.

Special Diets *Most special diets fail, in many cases within 5 to 7 days. Approximately 90% of those who succeed in losing weight will regain it within a year. Dieting is extremely dangerous and can prove fatal if the dieter does not observe certain nutritional guidelines. The best approach is to develop sound exercise and eating habits that one can follow throughout life.*

Underweight and Eating Disorders *Gaining weight is just as difficult as losing weight. A complete program of muscle-weight gain requires sound nutritional support and an organized weight-training program that involves up to six 2-hour workouts weekly.*

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