Weight Control and Diet

Introduction

Stable weight depends on an even balance between energy intake from food and energy expenditure. Energy expenditure occurs during the day in three ways:

- As energy expended during rest (*basal metabolism*). This accounts for about two-thirds of expended energy, which is generally used to maintain body functions, such as maintaining body temperature and muscle contractions in the heart and intestine.
- As energy used to metabolize food (*thermogenesis*), accounting for about 10% of expended energy.
- As energy expended during physical activity.

When a person's caloric intake exceeds his or her energy expenditure, the body stores the extra calories in the fat cells present in adipose tissue. These adipose cells function as energy reservoirs, and they enlarge or contract depending on how people use this energy. If people do not balance energy input and output by adopting healthy eating habits and regular exercise, then fat builds up, and they may become overweight.

Measurement of Obesity

Obesity is determined by measurement of body fat, not merely body weight. People might be over the weight limit for normal standards, but if they are very muscular with low body fat, they are not obese. Others might be normal or underweight, but still have excessive body fat. Different measurements and factors are used to determine whether or not a person is overweight to the degree that it threatens health:

- Body mass index (BMI) (a measure of body fat).
- Waist circumference.
- Waist-hip ratio.
- Anthropometry.
- The presence or absence of other disease risk factors (e.g., smoking, high blood pressure, unhealthy cholesterol levels, diabetes, relatives with heart disease) in addition to obesity. (Such risk factors plus BMI may be the most important components in determining health risks with weight.)

The Body Mass Index (BMI). The current standard measurement for obesity is the body mass index (BMI). In general, a BMI of 25 to 29.9 indicates being overweight. Obesity is a BMI of 30 and above. Obesity is then classified into three categories:

- class 1: BMI of 30 to 34.9
- class II: BMI 35 to 39.9
- class III: BMI of 40 and greater

These guidelines are very important for people at risk for diabetes, heart disease, or certain cancers. It is also used to determine treatment approaches, such when surgery may be appropriate. The higher the BMI the greater the risk for significant health problems.

Waist Circumference and Waist-Hip Ratio. The extent of abdominal fat can also be used in assessing risk of disease. Some studies suggest the following:

- Women whose waistlines are over 31.5 inches and men whose waists measure over 37 inches should watch their weight.
- A circumference of greater than 35 inches in women and 40 inches in men has been associated with a higher risk for heart disease, diabetes, and impaired functioning.

Highlights

Research Findings

Rimonabant (Accompli) belongs to a new class of drugs called selective CB1 blockers. Research presented at the annual European Society of Cardiology Conference reported that obese patients treated with 20 mg of rimonabant experienced significantly more weight loss and waist circumference reduction compared with patients who received placebo. The investigative drug may also help raise HDL ("good" cholesterol) levels.

Topirimate (Topamax) is an anti-seizure medication being investigated for weight reduction. Three clinical trials have reported that patients given topirimate lost more weight than those receiving placebo. Weight loss was sustained for up to one year. The drug is also being studied for binge-eating disorders associated with obesity. Topirimate is also approved for the prevention of migraines.

About Obesity

Obesity is defined as a body mass index (BMI) of 30 or over. It accounts for nearly 300,000 deaths in the United States each year, and is associated with numerous chronic health problems. Obesity results when the body consumes more calories than it uses.

Calculating Body Mass Index (BMI)

- Multiply one's weight in pounds by 703.
- Divide that answer by height in inches.
- Divide that answer again by height in inches.

Calorie Restriction

- One pound of fat equals approximately 3,500 calories. To lose a pound per week, reduce daily caloric intake by 500 calories a day.
- To determine the daily calories requirements for specific individuals, multiply the number of pounds of ideal weight by 12 to 15 calories. The number of calories per pound depends on gender, age, and activity levels.
- Fat intake should be no more than 30% of total calories. Most fats should be in the form of monounsaturated fats. Saturated fats should be avoided.
- Exercise is a key component of any weight loss program.

Calculating Body Mass Index (BMI)

One's body mass index (BMI) is derived by multiplying a person's weight in pounds by 703 and then dividing by the height in inches, then dividing that number by the height in inches. The steps are as follows:

- Multiply one's weight in pounds by 703.
- Divide that answer by height in inches.
- Divide that answer again by height in inches.

For example, a woman who weighs 150 pounds and is five feet eight inches (or 68 inches) tall has a BMI of 22.8.

Evidence strongly suggests that an unequal distribution of body fat around the abdomen and compared to the hips (the apple-shape) is a more consistent predictor of heart problems and health risks than BMI.

The distribution of fat can be evaluated by dividing waist size by hip size. For example, a woman with a 30-inch waist and 40-inch hip circumference would have a ratio of .75; one with a 41-inch waist and 39-inch hips would have a ratio of 1.05. The lower the ratio the better. The risk of heart disease rises sharply for women with ratios above 0.8 and for men with ratios above 1.0.

Anthropometry. Anthropometry is the measurement of skin fold thickness in different areas, particularly around the triceps, shoulder blades, and hips. This measurement is useful in determining how much weight is due to muscle or fat.

Biologic and Medical Causes

Obesity results when the body consumes more calories than it uses. Research points to several different factors that may influence weight gain. About 90% of people who diet gain every pound back that they lose regardless of their weight-loss method. Some evidence suggests that every person has an inherited weight range that varies by only about 10% either up or down from some set point. (For instance, a man whose "genetically-determined" weight is 200 pounds would tend to swing from 180 to 220 pounds, but would be unlikely to lose or gain more than this.) Genetic factors that influence fat metabolism and regulate certain hormones and proteins that affect appetite may play some part in 70% to 80% of obesity cases.

The Biologic Pathway to Appetite

Appetite, and, thereby weight, is determined by processes that occur in both the brain and gastrointestinal tract. Eating patterns are regulated by feeding and satiety centers located in the *hypothalamus* and *pituitary* glands of the brain that respond to signals indicating high fat stores and hunger. A number of molecules are produced that further control this process by stimulating or suppressing appetite. In some cases, genetic factors may produce imbalances in these chemicals:

- *Insulin.* Insulin is a hormone that is critical in the conversion of blood sugar (glucose) into energy. The process of digestion breaks down carbohydrates from our diet into sugar molecules (of which *glucose* is one) and proteins from our diet into their smaller components, *amino acids*. Right after a meal, the amount of glucose in the blood rises and signals the release of insulin, which then pours into the bloodstream. Insulin enables the glucose and amino acids to enter cells in the body, importantly, those in the muscles. Here, insulin and other hormones direct whether these nutrients will be burned for energy or stored for future use. The inability to use insulin efficiently (insulin resistance) has been associated with both obesity and diabetes.
- *Leptin*. Leptin is a hormone that is released by fat cells and also possibly by cells in the stomach. It appears to play an important role in insulin resistance and fat storage in the body, but its role in obesity is unclear. The most likely scenario is that in most people, leptin levels rise as more fat is stored in the cells and signal the hypothalamus in the brain to suppress appetite. Falling levels then signal the brain to stimulate appetite. In people who are genetically deficient in leptin, however, the brain may be tricked into thinking that it is always starving because there is no leptin to suppress appetite. Such people, then, would tend to gain weight.
- *Resistin.* Resistin is another hormone produced by fat cells and produces resistance to the activity of insulin. Some experts believe it may help explain the role of obesity in diabetes type 2.
- *Intestinal Chemicals*. Specific chemicals in the intestinal tract pass signals to the brain when a person is hungry or full. Ghrelin is produced in the stomach and appears to be important in triggering the desire to eat. Peptide YY3–36 (PYY) is a peptide secreted in the intestine after a meal in proportion to the number of calories a person eats. It signals fullness to the brain, and deficiencies may contribute to some cases of obesity. Researchers are hoping that blocking ghrelin or infusing PYY may be possible therapies for obesity.
- *Other Chemicals.* Many brain chemicals are being studied for their role in appetite stimulation and weight gain. Among them are neuropeptide Y, melanocortins, agouti-related protein, and melanocyte stimulating hormone. Chemicals known as endorphins may be critical in reducing appetite and regulating energy. Cholecystokinin, a hormone released in the upper intestine that stimulates digestive juices, may work to control meal size.

Specific Genetic Factors

Genetics may contribute directly to many cases of severe obesity in people with family histories of obesity. Genetic factors may also play indirect roles in susceptibility to being overweight in many people (such those who have slower metabolism than others). There are at least seven known genetic mutations that have been associated with specific and uncommon cases of severe obesity. A few are as follows:

- HOB1 (human obesity 1) is a recently identified gene that may contribute directly to obesity. The gene is significantly linked to high BMI in women.
- A number of variants of the leptin gene, including those that cause leptin deficiencies and obesity, have been identified.
- A gene called melanocortin-4 receptor that plays a key role in shutting off the urge to eat is defective in some families with a history of obesity.
- Researchers have also identified a mutation in a gene for a protein called proopiomelanocortin, which results in a syndrome of obesity, red hair, and deficiencies in stress hormones.
- About 5% of severely obese people have mutations that over-respond to agouti-related protein.

Genetics also determine the number of fat cells a person has, and some people are simply born with more. It should be noted that even when genetic factors are present, environ-

mental and dietary intake are still important and controllable in the great majority of obesity cases.

The Thrifty Gene. Although genetic abnormalities may make it harder or easier to lose weight, the prevalence of obesity has dramatically increased over the past two decades, and genes cannot have changed within that short amount of time. Human metabolism evolved over centuries so that it could conserve energy and store fat during times of famine. Most cases of obesity occur now in people with normal physiology who live in industrialized nations where food is overly plentiful, and it is easy to avoid expending enough energy to burn the excess calories. One theory that combines genetic and environmental factors suggests that type 2 diabetes and the obesity that usually accompanies this disorder are derived from genetic actions that were once important for survival.

Some experts postulate the existence of a so-called "thrifty" gene, which regulates hormonal fluctuations to accommodate seasonal changes. Theoretically, it works in the following manner:

- In certain nomadic populations, hormones are released during seasons when food supplies have traditionally been low, which results in resistance to insulin and efficiently increased fat storage.
- The process is reversed in seasons when food is readily available.
- Because modern industrialization has made high-carbohydrate and fatty foods available all year long, the gene no longer serves a useful function and is now harmful because fat, originally stored for famine situations, is not used up.

Such a theory could explain the high incidence of type 2 diabetes and obesity found in Pima tribes and other Native American tribes with nomadic histories and Western dietary habits. The traditional low-fat high-fiber foods (corn, lima beans, white and yellow teparies, mesquite, and acorns) of the Pima people may have protected this genetically susceptible population in the past from the high incidence of obesity and type 2 diabetes they are experiencing now.

Medical or Physical Causes of Obesity

A number of medical conditions may contribute to being overweight, although rarely are they a primary cause of obesity.

- Some overweight people may believe their weight problem is due to hypothyroidism; patients with an underactive thyroid, however, generally show only a moderate weight increase of five to 10 pounds, mainly due to accumulation of fluid.
- Very rare genetic disorders, including Froehlich's syndrome in boys, Laurence-Moon-Biedl, and the Prader-Willi syndromes, cause obesity.
- Abnormalities or injury to the hypothalamus region in the brain can cause a condition called hypothalamic obesity.
- Cushing's disease is a rare condition caused by high levels of steroid hormones, which results in obesity, a moon-shaped face, and muscle wasting.
- Obesity is also linked with polycystic ovarian syndrome, a common hormonal disorder in women.

Effects of Certain Medications

Some prescription medications contribute to weight gain, usually by increasing appetite. Such drugs include the following:

- Corticosteroids.
- Some female hormone treatments, including some oral contraceptives (usually temporary) and certain progestins (such as Megestrol) used to treat cancer.
- Antidepressants, and other psychoactive drugs, including certain antipsychotics, lithium, and antiseizure agents (such as valproate).
- In a particularly unfortunate conflict of interest for obese individuals with type 2 diabetes, the use of insulin and insulin-stimulating drugs used to treat the condition often leads to weight gain.
- Certain anti-seizure agents used in epilepsy and bipolar disorder can cause significant weight gain.
- Certain antipsychotics.
- Although drugs are not usually the primary cause of obesity or of being overweight, some people may be mistakenly tempted to stop taking their medications without their doctors' knowledge.

Cultural and Emotional Causes

Enough food is produced in the US to supply 3,800 calories every day to each man, woman, and child, far more than any single person needs to sustain life. In a 2002 study, subjects carefully recorded everything they ate and drank and all activities and psychologic factors surrounding the eating events. The people who gained weight ate more and their portions were larger than those who did not. This may be an obvious conclusion, but the public press often plays up biologic factors involved with obesity and overlooks the simple notion: Americans eat too much and exercise too little.

Obesity is dramatically increasing not only in American children and adults, but also in every country that has adopted similar cultural habits. The World Health Organization now considers obesity to be a global epidemic and a public health problem as more nations become "Westernized." In spite of the proven health risks of obesity, the government, insurance companies, and the medical profession spend very little money to counteract the commercial and cultural pressures that are producing millions of overweight people.

Television and Sedentary Habits

Perhaps the primary reason for the dramatic rise in obesity is the sedentary lives led by most Americans, including children and young people. In a 2003 study comparing modern life to the past, labor saving devices had reduced a person's energy expenditure by 111 calories a day--adding up to an extra 11 pounds a year. Half the difference in energy expenditure was due to less walking.

Regular television watching has been singled as the most hazardous pastime. According to a major 2003 study, for every two hours a person spends in front of the TV each day, the risk for obesity increases by 23% and for type 2 diabetes by 14%. In the study, TV watching produced the lowest metabolic rates compared to sewing, playing board games, reading, writing, and driving a car. Just the act of watching TV encourages unhealthy snacks and eating patterns and the advertising on the television compounds the problem by promoting fast foods, cereal, and snack products that are high in salt, fats, and carbohydrates. Even worse, much of these advertisements are directed at children--the most vulnerable group.

Fast Foods and Restaurant Eating

People are not only eating more than they did 20 years ago, but they are replacing home cooking with fast food, dining out, and

packaged foods. This behavior, according to studies, place people at higher risk for obesity. Fast foods may be more harmful than restaurant cooking. These foods tend to be served in larger portions and generally contain more calories and unhealthy fats and less ingredients of nutritional value than homemade or restaurant meals. Snack foods and sweet beverages, including juice and soft drinks, are specific culprits in the increasing prevalence of obesity. (Of note: frequent small healthy meals--as opposed to two or three large daily meals--are associated with lower weights.)

Stress

People react differently to chronic stress. Some overeat and gain weight and others stop eating and lose weight. Night-eating has particularly been associated with stress. People who gain weight in response to stress often overeat foods high in sugar, fats, and salt. A 2003 study on rats, in fact, suggested that stress hormones increase the pleasure from eating such so-called "comfort foods". Furthermore, it supported previous research indicating that stress-related eating was associated with the unhealthy accumulation of abdominal fat.

Risk Factors

Just living in the United States is a risk factor for obesity. The prevalence of obesity and being overweight in America has risen dramatically over the past few years and continues to increase. According to a 2002 analysis of government data, 30.5% of American adults are obese (BMI over 30)--up from about 23% in the early 1990s. The prevalence of being overweight also increased during that time from about 56% to a current rate of 64.5%. Even worse, 2% of the population is severely obese (more than 100 pounds overweight)--a rate that has quadrupled over the past 25 years. Obesity has increased in every state, in both men and women, across all age groups, and in every ethnic group, although some groups may face slightly higher risks than others.

Risk by Age. People of any age are at risk for obesity. More children and adolescents are overweight in America than ever before. Gaining some weight is inevitable with age and adding about 10 pounds to a normal base weight over time is not harmful. The current weight gain in American adults over 50, however, is significant. By age 55, the average American has added nearly 40 pounds of fat during the course of adulthood. This condition is made worse by the fact that muscle and bone mass decrease with age.

Risk by Gender. In men, BMI tends to increase until age 50 and then it levels off. In women, weight tends to increase until age 70 before it plateaus. A 2000 study has found that there are three high-risk periods for weight gain in women.

- The first is at the onset of menstruation, particularly if it is early. (Obesity in childhood may actually be a contributor to early puberty, which in turn increases the risk for more weight gain.)
- The second is after pregnancy, with higher risk for women who are already overweight.
- Finally, many women gain weight after menopause.

These findings are significant because they may allow women to target high-risk times, and consequently prevent unnecessary weight gain.

Risk by Economic Group. Obesity is more prevalent in lower economic groups. One 2002 study reported that women who reported that they did not have enough food were more likely to be overweight than those who said they had sufficient food. Researchers discovered that the low-income women tended to have fewer fruits and vegetables but were actually taking in more calories a day than higher-income women. In any case, obesity it is increasing in young adults with college education along with everyone else.

Ethnic Groups. Among ethnic groups in general, African American women are more overweight than Caucasian women but African American men are less obese than Caucasian men. (Currently, 80% of African American women are overweight.) Hispanic men and women tend to weigh more than Caucasians.

US Regions. Regionally, the prevalence of obesity is lowest in the Western states and highest in the South.

Dietary Habits That Increase Risk

A number of dietary habits put people at risk for becoming overweight:

- *Night-Eating Syndrome.* Night-eating syndrome is defined as having no appetite in the morning, insomnia, and consuming more than half of daily food intake after 6:00 PM. It is associated with obesity and is difficult to treat. Stress reduction and relaxation techniques may be helpful.
- *Binge Eating and Eating Disorders.* About 30% of people who are obese are binge eaters who typically consume 5,000 to 15,000 calories in one sitting. To be diagnosed as a binge eater, a person has to binge at least twice a week for six months. Many experts believe that binge-eating carbohydrates causes an increase in a natural opiate leading to dependence on carbohydrates, and, therefore, the condition should be treated as an addiction. Other eating disorders are bulimia and anorexia. Bulimia is binge eating followed by purging in order to lose weight. Anorexia nervosa is a mental illness in which the person refuses to maintain weight at the normal level because of a terrible fear of getting fat and an abnormal perception of what his or her body looks like. Both conditions pose risks for serious medical problems, and anorexia nervosa can be life threatening. A combined approach using behavioral therapy and antidepressants may help these individuals. [For more information, *seeWell-Connected* Report # 49, *Eating Disorders*.]
- *Restrained Eating.* Some people, mostly middle-aged women who have normal weight, have a pattern referred to as restrained eating. This pattern requires a high level of conscious control and usually maintains a lower weight. However, such restraint places these individuals at higher risk for loss of control and subsequent overeating.
- *Infrequent Eating.* There is some evidence to suggest that eating small frequent meals uses more calories than infrequent large meals. It should be strongly noted, however, that packaged snack foods add calories and some do not produce a feeling of being full, so that people simply eat more than they should.

Specific Groups at Risk

Anyone with Sedentary Lifestyles. Office workers, drivers, and anyone whose lifestyle involves sitting for long periods are at higher risk for obesity.

Ex-Smokers. The trend toward weight increase has followed the trend for quitting smoking. Nicotine increases the metabolic rate, and quitting, even without eating more, can cause weight gain, which may be considerable. It is important to note that weight control is not a valid reason to smoke. People in previous centuries did not smoke cigarettes, nor were they usually obese.

Shift-Workers. A recent study found that individuals who work late shifts (between 4PM and 8AM) tend to eat more and take longer naps than day workers and are more likely to gain excess weight.

People with Disabilities. Obesity rates are higher than average in people with physical or mental disabilities. Those with disabilities in the lower part of the body, such as the legs, are at highest risk.

Obesity in Children: Special Considerations

Obesity in children and adolescents is rising at an alarming rate. Currently over 15% of young people over six years old are obese, and obesity is also increasing children five and younger. According to a 2002 government analysis, 10% of American Caucasian and 18.5% of African American children under two years old are overweight.

Definition of Obesity in Children

Children are considered to be overweight if the BMI is over 85% of the weight group in their age and sex categories. If it is 95% and over, they are considered to be obese. Adolescents are generally judged according to adult criteria for obesity, although there are other considerations in this population. Ethnic variations, timing of growth spurts, and higher normal fat levels around puberty can cause disparities in these measurements.

Causes and Risk Factors for Obesity in Children

Lifestyle Factors. Without educational or parental guidance, children are extremely vulnerable to the intense cultural pressures that are largely responsible for the obesity epidemic. The following are some specific problems created by the culture:

- Excessive television watching plays a critical role in obesity in children. Not only is it a sedentary activity, but television also offers innumerable temptations with its advertisements for fast foods, sugar cereals, and unhealthy snacks. In one study obesity rates were lowest in children who watched television one hour or less a day and highest in those who watched four or more hours.
- Sugar, particularly from soda, other sweetened beverages, and fruit juice, may be major contributors to childhood obesity. One study reported that drinking soda regularly increases a child's risk for obesity by 60%. And the average American adolescent consumes 15 to 20 extra teaspoons a day just from soda and sugary drinks. (Juice, while better than soda, is still filled with sugar.)
- Less physical exercise and greater sedentary activities play another significant role in obesity in children. A high level of physical activity--not just using up energy--is important for weight control in young people. Unfortunately, according to one study, the annual distance walked by children has fallen by nearly 30% since 1972, partially because more parents are driving their children to school out of fear of abduction, molestation, and traffic accidents. Schools are also offering fewer opportunities for daily physical activities than in the past.

Neither the media nor the educational system has strong well-financed programs that encourage healthy alternatives, including exercise and healthy foods.

Family History. Parental obesity more than doubles the risk that a young child, whether thin or overweight, will become obese as an adult. In older children and teenagers, obesity in parents starts to count less as a predictor for body weight than their own weight. The risk for may be due to environmental or genetic factors, or both.

Ethnic and Socioeconomic Factors. As in adult populations, children from lower socioeconomic groups and minority populations are at higher risk for obesity. For example, among young Mexican Americans and African Americans, there has been an increase in overweight prevalence of about 13% to over 23%.

Factors Surrounding Birth. The following factors surrounding birth are associated with a child's weight:

- Low birth weight is a risk factor for later obesity and diabetes. One theory is that humans have a "thrifty gene" that produces metabolic changes in infants with low birth weight. Such changes affect insulin and fat accumulation in order to produce a "catch-up" weight in these young children as quickly as possible. This rapid weight gain in infancy increases the gain risk for obesity in children and also in young adulthood.
- In a study of African American children, having an overweight pregnant mother increased the risk for later weight gain, but low birth weight did not.

Although some small studies have reported protection against obesity from breastfeeding, evidence is weak. In a 2003 study, for example, children who were breast fed for three to five months had a lower risk for obesity, but prolonged breastfeeding had no effect. Nevertheless, given the healthful effects of breast feeding and the possibility that it may have even a slight impact on childhood obesity, it is highly recommended.

Biologic Effect of Childhood Obesity on Adult Weight

Achieving a healthy weight becomes more difficult as children get older. The odds of obesity persisting into adulthood ranges from 20% in four-year olds to 80% in teenagers. One reason for the persistence is biologic; fat cells change in number or mass depending on a person's age:

- Fat cells themselves multiply during two growth periods: early childhood and adolescence. Overeating during those times, then, increases the number of fat cells. (Some people are also just born with more fat cells.)
- After adolescence, fat cells tend to increase in mass rather than quantity, so that adults who overeat and gain weight tend to have larger fat cells, not more of them. This growth in mass may be responsible for the greater risk for persistent obesity among teenagers than in small children who are overweight. Losing weight in after adolescence, then, reduces the size of the fat cells but not their number, so weight loss becomes much more difficult.

Health Consequences of Childhood Obesity

Children and adolescents who are obese have poorer health than other children. Studies are reporting unhealthy cholesterol levels and high blood pressure in obese children and adolescents. Of great concern is the dramatic increase in type 2 diabetes in young people, which is most certainly largely due to the increase in obesity. Obesity in children is also linked to asthma, gallbladder problems, sleep apnea, and liver abnormalities. Childhood obesity may be partly responsible for the declining age for onset of puberty in girls, with subsequent risks for breast cancer.It is not clear yet how many of these childhood problems persist in people who achieve normal weight as adults. Staying overweight into adulthood certainly confers health risks.

Managing Overweight and Obese Children

Childhood obesity is best treated by a non-drug, multidisciplinary approach including diet, behavior modification, and exercise. Some evidence suggests that reducing calories by only 200 to 260 per day

would prevent weight gain in most overweight children. Here some tips for children who are overweight:

- Limit or avoid if possible take out, fast foods, high-sugar snacks, commercial packaged snacks, soda and sugar sweetened beverages (including too much juice).
- Let children snack but make sure the snacks are healthy. Eating small frequent healthy meals (instead of two or three large ones) has been associated with being thinner and having a better cholesterol profile.
- Let children choose their own food portions. One study indicated that children naturally ate 25% less then they chose their own portion size. When they were given larger portions their bite sizes were larger and they ate more.
- Don't criticize a child for being overweight. It does not help and such attitudes could put children at risk for eating disorders, which are equal or even greater dangers to health.
- Limit television, video games, and computer use to a few hours a week. This can contribute significantly to weight control, regardless of diet and physical activity.
- For young children, try the traffic-light diet. Food is designated with stoplight colors depending on their high caloric content: Green for go (low calories); yellow for "eat with caution" (medium calories); red for "stop" (high calories).
- Try a low-glycemic index diet. This may be as beneficial and possibly more than a standard reduced-fat diet in obese children. Such a diet focuses on carbohydrates, such as dried beans and soy, that raise blood sugar more slowly than others. This diet is sometimes used in diabetes and as a dietary approach in overweight adults. [For more information, *see Well-Connected Report* #42, *Diabetes Diet*.]

Complications

General Adverse Effects of Obesity. Obesity, defined as a body mass index (BMI) of 30 or over, accounts for nearly 300,000 deaths in the US each year. It is associated with more chronic health problems than smoking, heavy drinking, or being poor. Furthermore, given the current increase in obesity, it will surpass smoking as the most important preventable cause of death in America.

Some studies indicate that the following health risks by body mass:

- The lowest risks for heart disease, diabetes, and some cancers are in people with body mass index (BMI) values of 21 to 25.
- The risks increase slightly when BMI values are between 25 and 27.
- They are significant in BMIs between 27 and 30.
- They are dramatic over 30.

Anyone with chronic health problems (e.g., heart or lung disease, stroke, or arthritis) or risk factors for them must be concerned about extra weight. In general, obesity may contribute to disease in several ways:

- *Metabolic Changes.* As fat stores increase, the fat cells themselves enlarge and produce a number of chemicals that increase the risk for a number of diseases. Such diseases may include diabetes, high blood pressure, gallbladder disease, and some cancers.
- *Increased Mass.* The increased body weight itself causes structural problems that cause injury and diseases, including osteoarthritis and sleep apnea.
- *Harmful Fat Cell Types.* Weight concentrated around the abdomen and in the upper part of the body (the so-called apple shape) poses a higher health risk than fat that settles around the hips and flank (the pear shape). Fat cells in the upper part of the body appear to have different qualities from those found in the lower parts. In fact, studies suggest a higher risk for diabetes in people with the "apple shape" and lower risk in those who are "pear shaped".

General Adverse Effects of Being Overweight (but not obese). It is still not clear if being overweight (a BMI of 25 to 29.9) hurts healthy people with no risk factors for serious illnesses.

According to one 2001 study, just being overweight increases the risk for developing diabetes, gallstones, hypertension, heart disease, stroke, and colon cancer. The risk rose proportionally with the degree to which the individuals were overweight. In any case, adults who are overweight in middle age face a poor quality of life as they age, with the quality declining the greater the weight. (One study suggested, however, that being over 65 and overweight but not obese is not associated with any higher mortality rates).

Some experts argue, in fact, that in anyone who is not severely obese, it is the unhealthy diet and sedentary lifestyle that causes harm--not weight per se. In support of this argument, a British study found that overweight fit individuals had half the death rate of unfit trim individuals.

Being somewhat overweight may also have some benefits under specific circumstances:

- In older women, some excess fat may produce extra estrogen that helps slow down bone loss and insulates bones from fall-related injuries. (It should be strongly noted, however, that when older overweight women lose weight they report improved vitality, physical function, and less pain.) The same positive effect of overweight does not appear to hold in older men.
- Conditioned athletes may have high BMIs because of very dense muscle tissue. Being fit in general may protect many overweight people.
- Some evidence suggests that Caucasians have the lowest mortality with BMIs of 24.3 to 24.7 while African Americans are better off in the range of 26.8 to 27.1.
- Children may have higher normal fat levels during growth spurts and around puberty.

It should be stressed, however, that obesity itself is never healthful in anyone.

Heart Disease and Stroke

Individuals with a BMI of at least 30 have a 50% to 100% increased risk for death compared with individuals at a BMI of 20 to 25. Mortality rates from many causes are higher in obese people, but heart disease is the primary cause of death. People who are obese have almost three times the risk for heart disease as people with normal weights. Being physically unfit adds to the risk.

Weight concentrated around the abdomen and in the upper part of the body (apple-shaped) is particularly associated with insulin resistance and diabetes, heart disease, high blood pressure, stroke, and unhealthy cholesterol levels. Fat that settles in a "pear-shape" around the hips and flank appears to have a lower association with these conditions.

Obesity poses many dangers to the heart and circulatory system.

Damage in the Blood Vessels. Changes in body fat as people age, particularly increasing abdominal fat, have specifi-

cally been associated with stiffness in the aorta, the major artery leading from the heart. Studies are finding higher levels of a factor called C-reactive protein (CRP) in people with obesity and abdominal fat. CRP is now considered to be a marker for inflammation and damage in the arteries. (Losing weight reduces CRP levels.)

High Blood Pressure. Hypertension is the health problem most commonly associated with obesity, and the greater the weight, the greater the risk. Hypertension carries serious risks for stroke, heart attack, and heart failure. The link between obesity and high blood pressure is complex and may reflect interactions of genetic, demographic, and biologic factors. Many studies have reported that modest weight loss is beneficial for reducing existing blood pressure. [For more information, *seeWell-Connected* Report #14, *High Blood Pressure*.]

Heart Failure. An important 2002 study reported that obesity might account for 11% of heart failure cases in men and 14% in women. This link existed independently of other risk factors, such as high blood pressure, sleep apnea, and diabetes, which are also associated with obesity. The biologic mechanisms involved in obesity that lead specifically to heart failure are not clear. [For more information, *seeWell-Connected* Report #13, *Heart Failure*.]

Unhealthy Cholesterol Levels and Lipid Levels. The effect of obesity on cholesterol levels is complex. Although obesity does not appear to be strongly associated with overall cholesterol levels, among obese individuals triglyceride levels are usually high while HDL (the so-called "good" cholesterol) levels tend to be low, both risk factors for heart disease. [For more information, *seeWell-Connected* Report #23, *Cholesterol, Other Lipids, and Lipoproteins*.]

Stroke. Obesity is also associated with a higher risk for stroke. [For more information, *seeWell-Connected* Report #45, *Stroke*.]

Insulin Resistance, Type 2 Diabetes, and Syndrome X (Metabolic Syndrome)

Type 2 Diabetes and Insulin Resistance. Most people with type 2 diabetes are obese and, in fact, studies strongly suggest that weight loss may be the key in controlling the current epidemic in diabetes type 2. The connection between obesity and diabetes is not entirely clear, since most obese people are not diabetic.

The common factor appears to be *insulin resistance.* Insulin is a critical hormone in the metabolism of sugar. In type 2 diabetes, different factors cause the body to become insulin resistant--that is, it can no longer use it. This has the effect of increasing blood glucose (sugar in the blood), the hallmark of diabetes. Both obesity and insulin resistance at different phases are marked by elevated levels of certain chemicals (e.g., free fatty acids and the hormones resistin and leptin). It is not known yet if the higher levels are simply a product of obesity or play some causal role in diabetes.

Insulin resistance is also associated with high blood pressure and abnormalities in blood clotting. Some research indicates that obesity, in fact, is the one common element linking insulin resistance, diabetes type 2, and high blood pressure. [For more information, see the *Well-Connected* Report #60, *Diabetes Type 2*.]

Metabolic Syndrome. Metabolic syndrome (also called syndrome X) is a pre-diabetic condition that is significantly associated with heart disease and higher mortality rates from all causes. The syndrome consists of obesity marked by abdominal fat, unhealthy cholesterol levels, high blood pressure, and insulin resistance. A 2002 study estimated that nearly a quarter of the U.S. population now has this condition. Even worse, according to a 2003 study, nearly a million American teenagers have this syndrome. A combination of weight loss and exercise is an effective treatment for this syndrome.

Cancer

Obesity has been associated with a higher risk for cancer in general and specific cancers in particular. Studies have also suggested that restricting calories reduces the risk for cancer. Some experts believe that effective weight control for children and adults could reduce cancer rates by 30% to 40%. One way obesity may increase the risk for cancer is its association with high levels of hormones called growth factors, which can trigger rapid cell proliferation leading to cancer.

Uterine Cancers. Women who are obese appear to have two to three times the risk for uterine cancer as thinner women.

Prostate Cancer. A 2001 study reported that obesity was associated with a modest increase in prostate cancer mortality, although not with the risk for prostate cancer itself. Some evidence suggests that it is a high-calorie intake rather than obesity or fat intake increases the risk for prostate cancer.

Breast Cancer. Studies have reported mixed effects on the association between obesity and breast cancer. A number of studies have linked obesity to breast cancer in postmenopausal women, particularly in women who begin to gain weight after age 18. One study, in fact, suggested that being heavier as a child conferred a *lower* risk for breast cancer after menopause.

Gallbladder Cancer. Obese women are at higher risk for gallbladder cancer.

Gastrointestinal Cancers. A number of cancers in the gastrointestinal tract have been associated with obesity:

- Cancer of the esophagus. The increased risk may be due to a higher incidence of gastroesophageal reflux disorder (heartburn) in people who are overweight.
- Colon cancer. There is a demonstrated link between increased body mass and colon cancer risk for both men and women.
- Pancreatic cancer. There has been a weak association between obesity and pancreatic cancer, with one study reporting a lower risk in overweight people who are physically active.

(Obesity does *not* appear to be related to a higher risk for stomach cancer.)

Muscles and Bones

Obesity places stress on bones and muscles, and overweight people are at higher risk for hernias, low back pain, and aggravation of gout and other arthritic conditions. Studies report that the incidence of osteoarthritis is significantly increased in people who are overweight. People who are obese are also at higher risk for carpal tunnel syndrome and other problems involving nerves in their wrists and hands. It should be noted that some weight may be protective against osteoporosis (loss of bone density).

Eyes and Mouth Disorders

Obesity increases the risk for the following mouth and eye disorders:

- Gum disease.
- Cataracts. A study of 17,150 men concluded that there is a higher association between cataracts and greater body mass, height, and carrying fat around the abdomen.

- Maculopathy. Maculopathy is an eye disease related to aging. Obesity also appears to be related to this disease.

Reproductive and Hormonal Problems

Infertility. Abnormal amounts of body fat, either 10% to 15% too high or too low, can contribute to infertility in women. Obesity is specially related to certain problems related to infertility, such as uterine fibroids or menstrual irregularities. In men, obesity can contribute to reduced testosterone levels.

Effect on Pregnancy. The dangerous effects of obesity on pregnancy are multifold. They include high blood pressure, gestational diabetes (diabetes, usually temporary, that occurs during pregnancy), urinary tract infections, blood clots, prolonged labor, a higher fetal mortality rate in late stages of pregnancy, and cesarean delivery. Infants of women who are obese are also at higher risk for neural tube birth defects, which affect the brain or spine. Folic acid supplements, ordinarily effective in preventing these conditions, may not be as protective in overweight women.

Effects on the Lungs

Obesity is thought to be a risk factor for adult-onset asthma, although there is some evidence that although obesity causes wheezing and shortness of breath, it does not appear to be strongly associated with the disease mechanisms in the lungs that cause true asthma.

Obesity also puts people at risk for *hypoxia*, in which oxygen is insufficient to meet the body's needs. Obese people need to work harder to breathe and tend to have inefficient respiratory muscles and diminished lung capacity. The Pickwickian syndrome, named for an overweight character in a Dickens novel, occurs in severe obesity when lack of oxygen produces profound and chronic sleepiness and, eventually, heart failure.

Effect on the Liver

Nonalcoholic Fatty Liver Disease. People with obesity, particularly if they also have diabetes type 2, are at higher risk for a condition called nonalcoholic fatty liver disease, also called nonalcoholic steatohepatitis (NASH). It may occur in about half of people with diabetes and 20% to 50% of obese people, depending on how severe the obesity is. It can also occur in overweight children. This condition causes liver damage that is similar to liver injury seen in alcoholism. In some cases, it can be very serious and require liver transplantation.

Gallstones. The incidence of gallstones is significantly higher in obese women and men. The risk for stone formation is also high if a person loses weight too quickly. In people on ultra-low calorie diets, gallstones may be prevented by taking ursodeoxycholic acid (Actigall).

Sleep Disorders

People who are obese and nap tend to fall asleep faster and sleep longer during the day. At night, however, it takes them longer to fall asleep and they sleep less than people with normal weights. In an apparent vicious circle, studies have suggested that obesity not only interferes with sleep but that sleep problems may actually contribute to obesity.

Sleep Apnea. Obesity, particularly the apple-shape, is strongly associated with sleep apnea, which occurs when the upper throat relaxes and collapses at intervals during sleep, thereby temporarily blocking the passage of air. Sleep apnea is increasingly being viewed as a potentially serious health problem, including heart disease and stroke. Some studies suggest that among overweight people, those who have sleep apneas have a greater heart risk than those without them. Obesity may contribute to sleep apnea simply by fatty cells infiltrating the throat tissue, which could narrow the airways. In one study, the more obese a person with sleep apnea was, the higher the pressure on the airway and therefore the greater the obstruction of the airway. (Obstructive sleep apnea may also cause obesity itself, however, as sleepy people tend to be sedentary.) Some studies are even indicating that treating sleep apnea may help people lose abdominal fat.

Narcolepsy. A small European study found a link between narcolepsy (a sleep disorder characterized by excessive daytime sleepiness with frequent daily sleep attacks) and high BMI.

Emotional and Social Problems

Depression. A number of studies have reported an association between depression and obesity, particularly in obese women. There may be a number of factors to explain the link. In some cases of atypical depression, people overeat and may gain weight. Overweight people may also become depressed because of social problems and a poor self-image. In these cases, depression is usually resolved when people lose weight. There is also some evidence, however, that obesity itself may impair levels of tryptophan--a precursor of serotonin, which is a brain chemical associated with mental well-being. In one study, even after people lost weight, tryptophan levels were lower than normal. In any case, there does not appear to be any association between depression and obesity in men.

Social Problems. One long-term study reported that overweight young women completed fewer years of school, were 20% less likely to be married, and had 10% higher rates of household poverty than their thinner peer. Obese young men were also less likely to be married their incomes were lower than their thinner peers. Nevertheless studies consistently show that overweight males (both boys and men) are not as severely emotionally affected as females of any age. Women and girls tend to blame themselves for being heavy while males tend to attribute being overweight to outside factors.

Weight Loss and Maintenance

Even modest weight loss can reduce the risk factors for heart disease and diabetes. The simplest (but still difficult) approach to weight loss is reducing calories and exercising at least 150 minutes a week. Behavioral and mental changes in eating habits, physical activity, and attitudes about food and weight are also essential to weight management. For people who are very overweight and cannot lose weight using lifestyle measures, a number of effective weight-loss medications are available. And for those with severe obesity, surgical procedures are proving to be very beneficial.

Some Tips for Losing Weight. The following offer some general suggestions for dieters:

- Start with realistic goals. Diet failure is extremely common and the odds of significant weight loss are low, particularly in people with the highest weights. People who are able to restrict calories, engage in an exercise program, and obtain help in making behavioral changes can expect to lose between 5% and 10% of their current body weight--which is generally all that is needed to achieve meaningful health changes. Certainly, the unwholesome and distorted image of a super-thin female shape should not be anyone's goal. (Anorexia, obesity's alter ego, is far less common but is the other side of this dysfunctional aspect of our culture.)
- Maintain a regular exercise program, assuming no precluding health problems. Choose one that is enjoyable. Check with a physician about any health considerations. [For more information, *see Well-Connected* Report #29 *Exercise*.]

- Do not use hunger pangs as cues to eat. A stomach that has been stretched by large meals will continue to signal hunger for large amounts of food until its size reduces over time with smaller meals.
- Be honest about how much you eat and start by recording all calories in writing. Studies suggest that when many people report their own calories intake they significantly underestimate their consumption of high-calorie and over-estimate the low-calorie foods. People who do not carefully note everything they eat tend to take in excessive calories when they believe they are dieting.
- Observe weekend eating. People tend to eat more on the weekends. If it is difficult to monitor all meals during the week, it be may be useful to at least track eating habits during these days.
- Once the pound are lost, strive to maintain the healthier weight. Make daily, even hourly, conscious decisions about eating and exercising activities. Such thinking, in many cases, can become automatic and not painful.
- Don't give up, even after repeated weight loss failure. Most studies indicate that yo-yo dieting or weight cycling has no adverse psychological or physical effects. Repeated dieting also does not impair the body's ability to burn calories efficiently.
- Weight loss, in any case, should not be the only or even the primary goal for people concerned about their health. The success of weight reduction efforts should be evaluated according to improvements in chronic disease risk factors or symptoms and by the adoption of healthy lifestyle habits, not by just the number of pounds lost.

Weight Management

There are many approaches to dieting and many claims for great success with various fad diets. They include calories restriction, low-fat/high-fiber, or high protein and fat/low carbohydrates. Some evidence suggests that people may respond differently to specific diets depending on whether their weight is overly distributed around the abdomen or not. According to a 2003 report comparing four major diets (Atkins, the Zone, Ornish, and Weight Watchers), any healthful diet that achieves weight loss helps the heart. To date, although many diets achieve effective immediate weight loss, none has emerged as an effective tool for maintaining healthy weight. The only definite recommendation that can be made about any diet plan is to be sure to include an exercise program, assuming there are no health problems to preclude it.

Calorie Restriction

Calorie restriction has been the cornerstone of obesity treatment. The standard dietary recommendations for losing weight are the following:

- As a rough rule of thumb, one pound of fat equals about 3,500 calories, so one could lose a pound a week by reducing daily caloric intake by about 500 calories a day. Naturally, the more severe the daily calorie restriction, the faster the weight loss. Very-low calorie diets have also been associated with better success, but extreme diets can have some serious health consequences.
- To determine the daily calories requirements for specific individuals, multiply the number of pounds of ideal weight by 12 to 15 calories. The number of calories per pound depends on gender, age, and activity levels. For instance, a 50-year old woman who wants to maintain a weight of 135 pounds and is mildly active might require only 12 calories per pound (1,620 calories a day). A 25-year old female athlete who wants to maintain the same weight might require 25 calories per pound 2,025 (calories a day).
- Fat intake should be no more than 30% of total calories. Most fats should be in the form of monounsaturated fats (such as olive oil). Saturated fats (found in animal products) should be avoided.

Low-Fat and High-Fiber Diets

Some studies suggest that replacing foods high in fats with low-fat complex carbohydrates (fruits, vegetables, and whole grains) may be more effective than calorie counting, particularly in maintaining weight loss. This dietary approach requires counting only grams of fat with the goal of achieving 30% or fewer calories from fat. (One gram of fat contains nine calories while one gram of carbohydrates or protein has only four calories, and dietary fat converts more readily to fat in the body than carbohydrates or proteins.) Simply switching to low-fat or skimmed diary products may be sufficient for some people.

Key Components of a Lifestyle Change Program	
Lifestyle	Reduce rate of eating. Keep food records. Eliminate environmental triggers to eating. Identify high-risk situations for overeating. Uncouple eating from other activities.
Exercise	Confront psychological barriers to exercise. Understand mechanisms linking exercise to weight control. Establish reasonable exercise goals. Develop a plan for regular activity.Integrate increased activity into daily lifestyle.
Attitudes	Develop reasonable weight-loss goals. Avoid "all or none" thinking. Focus attention away from the scale and toward behavior. Uncouple weight from self-esteem. Recover from lapses with constructive action (relapse prevention).
Relationships	Understand the key role of social support to health. Identify supportive others. Match personal style to support-seeking activities. Be specific in making support requests. Be assertive but reinforcing in drawing help from others.
Nutrition	Resist the lure of popular fad diets. Develop pro-health rather than restriction mentality about eating. Eat with moderation in mind. Maximize fiber.Develop a tailored plan.

From Brownell KD. The LEARN Program for Weight Control. 7th ed. Dallas, Tex: American Health Publishing Company; 1998.

There are possible drawbacks to this approach, however:

- Some people who reduce their fat intake may not consume enough basic nutrients, including vitamins A and E, folic acid, calcium, iron, and zinc. People on low-fat diets should consume a wide variety of foods and take a multivitamin if appropriate. Calcium deficiencies may be particularly harmful in women at risk for osteoporosis.
- Many people over-increase their intake of carbohydrates, believing that they are not adding calories. No one should use a low-fat diet as an excuse for over-consuming carbohydrates, particularly starchy foods and sugar. A high-calorie diet from any source will add pounds.
- Replacing fatty foods, such as cakes, cookies, and chips, with their commercial "low-fat" counterparts does not constitute a low-fat diet. These foods generally contain more sugar and hence calories, not to mention other ingredients, which have virtually no nutritional value. In fact, a 2002 study suggested that increasing sugar may, over time, reduce levels of HDL cholesterol, the so-called good cholesterol.
- Very low-fat diets may increase the risk for stroke from hemorrhage in the brain.

Some fat in a diet is essential. It should be derived from plant oils and fish, however, and not from saturated fat from animal products or trans-fatty acids from hydrogenated (hardened) oils. (Trans-fatty acids, in fact, are more of a risk factor for obesity than saturated fats, although both should be avoided.)

Fiber and Complex Carbohydrates. In all cases, complex carbohydrates found in whole grains and vegetables are preferred over those found in starch-heavy foods, such as pastas, white-flour products, and potatoes. Fiber is an important component of many complex carbohydrates. Fiber is almost always found only in plants, particularly vegetables, fruits, whole grains, nuts, and legumes (beans and peas). (One exception is chitosan, a dietary fiber made from shellfish skeletons.) Fiber cannot be digested but passes through the intestines, drawing water with it and is eliminated as part of feces content. The following are specific advantages from high-fiber diets (up to 55 grams a day):

- Insoluble fiber (found in wheat bran, whole grains, seeds, nuts, and fruit and vegetable peels) has been associated with weight loss. Studies also suggest that diets rich in fiber from whole grains reduce the risk for type 2 diabetes.

Warning on Extreme Diets

Extreme diets of less than 1,100 calories carry health risks and are often followed by bingeing or overeating and a return to the obese state. Such diets often have insufficient vitamins and minerals, which must then be taken as supplements. Most of the initial weight loss is in fluids. Later, fat is lost, but so is muscle, which can account for more than 30% of the weight loss. No one should be on severe diets longer than 16 weeks or fast for more than two or three days. Severe dieting has unpleasant side effects, including fatigue, intolerance to cold, hair loss, gallstone formation, and menstrual irregularities. There have been rare reports of death from heart arrhythmias when liquid formulas did not have sufficient nutrients. Pregnant women who excessively diet during the first trimester put their unborn children at risk for birth defects. Of note, those whose diets include a high intake of fluids and much reduced protein and sodium are at risk for hyponatremia, which can cause fatigue, confusion, dizziness, and in extreme cases, coma.

- Soluble fiber (found in dried beans, oat bran, barley, apples, citrus fruits, and potatoes) has important benefits for the heart, particularly for achieving healthy cholesterol levels and possibly benefiting blood pressure as well. Simply adding breakfast cereal to a diet appears to reduce cholesterol levels. People who increase their levels of soluble fiber should also increase water and fluid intake.

High-Protein Diets

High-protein diets, such as the Atkins and South Beach diets, are proving to be very effective in producing short-term weight loss. Because of their emphasis on fats and proteins, many experts are concerned about long-term health problems. Still, significant studies are reporting benefits on cholesterol and blood sugar levels. Centers that promote this approach argue that heart problems from obesity are due to insulin disturbances from sugar imbalances. Therefore, they believe that restricting carbohydrates is the best approach for obesity--and especially for overweight people with diabetes. More research is needed, however, to determine the long-term impact on health.

High-Protein, Low-Carbohydrate Diets. High-protein, low-carbohydrate diets have become popular again. They include Dr. Atkins, Protein Power, Sugar Busters, and Dr. Stillman. The Atkins diet is currently among the most popular and has a four-phase program:

- Induction. For the first two weeks, individuals consume no more than 20 grams of carbohydrates a day (no fruit, bread, grains, starchy vegetables, or dairy products other than cheese, cream or butter.) They eat pure protein and fats. (This phase is not suitable for children, pregnant women, or anyone with kidney disease.)
- On-going Weight Loss. After the first phase, individuals continue to lose weight while they increase carbohydrate levels by five grams each week.
- Premaintenance. When individuals get close to their weight goal, they add another 10 grams of carbohydrates per week as long as they do not begin to gain weight. Weight loss is very slow at this time, but the individual is now getting used to maintenance.
- Maintenance. Lifetime maintenance is usually between 40 and 100 grams of carbohydrates a week, depending on steady weight level.

Studies are reporting effective short-term weight loss with the diet, although it is not clear if the high-protein diet is any better than low-fat diets for maintaining the weight loss. Contrary to expert expectations, this diet also may have some important heart benefits. Studies in 2002 and 2003 have indicated that the diet lowers blood glucose levels, which can be important in people who are diabetic. The diet also reduces triglycerides (unhealthy fat molecules) and increases HDL (so-called good cholesterol) levels. High triglyceride and low HDL levels are important risk factors for heart disease and common in people with type 2 diabetes. Studies are mixed on whether the diet reduces overall cholesterol or LDL (the bad) cholesterol.

Anyone who chooses this diet should prefer fish or soy products to meat as protein sources. Fish may reduce leptin, a hormone associated with fat storage and heart diseases, and would be the best protein source. People on this diet should also choose monounsaturated fats (as in olive oil) over saturated fats or trans-fatty acids fat. Patients often

need supplements, at least a multivitamin and possibly calcium, chromium, omega-3 fatty acids (found in fish oil), and other supplements.

One negative byproduct of this diet is the release of substances called ketones, which can cause nausea, lightheadedness, and bad breath. Long-term effects on health are still unknown in people who continue to adhere to it. For example, the Atkins diet restricts some vegetables and most fruits that are known to protect against serious diseases--not only heart problems, but also cancer. The diet also may produce excessive calcium excretion in urine, which can increase the risk for kidney stones and osteoporosis. In any case, high-protein intake, particularly from meat, can be harmful in people with kidney problems. Individuals at risk for kidney stones or who have other kidney problems should not go on high-protein diets without consulting their physicians. Unfortunately, many people with diabetes are subject to kidney problems, which could negate any possible benefits for them. A high meat intake has also been associated with certain common cancers, notably prostate and colon cancers. A 2002 study suggested that such diets during pregnancy may increase the risk for high blood pressure in the offspring.

High-Protein, Favorable Carbohydrates. High-protein diets, such as the South Beach Diet and the Zone, encourage healthy fats but also allow favorable carbohydrates. For example the Zone uses healthy carbohydrates (vegetables, dried beans) and unsaturated fats. The South Beach diet uses carbohydrates with low-glycemic index scores. These are selected foods containing carbohydrates that delay the increase in blood sugar after a meal compared to other foods. Low-glycemic foods include barley, dried bean and peas, milk, strawberries, and apples. High-glycemic foods include refined grains, white bread, white potatoes, and bananas and other tropical fruits. The glycemic index was developed for use in diabetes--not for weight loss. Nevertheless, there is some evidence that foods with low glycemic indexes may produce a feeling of fullness and so discourage further eating. As with any high-protein diets, people at risk for kidney stones or have other kidney problems should avoid these plans.

Liquid Meal Replacements

Some studies have reported good success with meal replacement beverages (Slim-Fast, Sweet Success). They contain major nutrients needed for daily requirements; each serving typically contains between 200 to 250 calories and replaces one meal. (Using them for all meals reduces calories to a severe extent and can be harmful.) One study reported that most subjects who had undergone a 12-week weight loss program and then used Ultra Slim Fast supplements as directed for maintenance kept off more than half their weight loss after more than three years. A quarter of the subjects were still losing weight.

Support Groups and Behavioral Approaches

Commercial and Non-Profit Support Programs for Weight Loss. This report cannot possibly address the many commercial and nonprofit weight-loss programs currently available or assess their claims. Taking off Pounds Sensibly (TOPS), a nonprofit support organization with many local chapters, is the least expensive program, costing $20 a year. Most of the commercial programs, such as Weight Watchers, Jenny Craig, and NutriSystem offer individual or group support, lifestyle changes and packaged meals. These programs tend to be expensive. There are few well-conducted studies on these programs. One 2003 study reported modest weight loss over two years with Weight Watchers compared to a self-help program. (There were no differences in heart risk factors).

Cognitive Behavioral Approaches. Most support programs use some form of cognitive-behavioral methods to change the daily patterns associated with eating. They are very useful for preventing relapse after initial weight loss. The following is a typical approach may work as follows:

- The patient first records in a diary all activity related to eating patterns, including the times of day, length of meal, emotional states, companions, and, of course, the kind and amounts of food eaten. (Most people--even professional dieticians according to one study -- tend to underreport their daily calorie intake, but it is still a good method for increasing their awareness of eating patterns.) One patient said that recording circumstances surrounding relapses was a particularly valuable guide for understanding the stresses leading to her own eating behaviors.
- The patient reviews the diary with a therapist or group to set realistic goals and identify patterns that the patient can change. For instance, if food is normally eaten while watching television, then the patient may be advised to eat in another room instead.
- Good eating habits are reinforced by rewards, other pleasures that substitute for high calorie consumption and sedentary activities.

Behavioral modification has been shown to be helpful particularly for people who have an overly strong response to the taste, smell, and appearance of food. It also may be useful for binge eaters.

Stress-Reduction Techniques. Stress reduction and relaxation techniques may be helpful for some people with obesity, such as those whose weight is related to night-eating syndrome. [For information on such techniques, *see Well-Connected* Report #31 *Stress*.]

Changing Sedentary Habits and Exercise

Changing Sedentary Habits. Making even small changes in physical activity can expend energy. For example, simply getting up to turn on and off the TV instead of using the remote and standing while talking on the phone may drop up to five pounds a year. Other suggestions include cooking one's own food (instead of eating take out or fast food), walking to as many places as possible, using stairs instead of escalators or elevators, and gardening. Even fidgeting may be helpful in keeping pounds off, and, in one study, chewing gum increased energy expenditure. No one should rely on such mild activities, however, for serious weight loss. Only high levels of physical activity -- not just using up energy -- help prevent obesity.

Approach to Exercise. Exercise, which replaces fat with muscle, is the critical companion for any weight control program. In a one-year study, women who regularly averaged 3.5 days (176 minutes) of exercise each week lost significantly more weight than women who did not exercise regularly. Women who exercised more than 195 minutes a week lost nearly 7% of their abdominal fat.

People who exercise are more apt to stay on a diet plan. Exercise improves psychological well-being and replaces sedentary habits that usually lead to snacking. Exercise may even act as a mild appetite suppressant. Moreover, exercise improves overall health even with modest weight loss. In support of this, a British study found that overweight fit individuals had half the death rate of unfit trim individuals.

Be forewarned, however, that the pounds won't melt off magically. Losing significant weight requires both intensive exercise and calorie restriction. In addition, if a person exercises but doesn't diet any actual pounds lost may be minimal because dense and heavier muscle mass replaces fat. Nonetheless, regardless of weight loss, a fit body will look more toned and be healthier. In addition, exercise benefits the heart even with modest weight loss.

The following are some suggestions and observations on exercise and weight loss:

- The more strenuous the exercise, the better the chances for short- and long-term success. With intense exercise, the metabolism continues to burn calories before returning to its resting level. This state of elevated metabolism can last for as little as a few minutes after light exercise to as long as several hours after prolonged or heavy exercise.
- The treadmill burns the most calories of standard aerobic machines. It may be particularly effective when used in short multiple bouts during the day. In fact, exercise sessions as short as 10 minutes in duration that are done frequently (about four times a day) may be the most successful program for obese people.

Fat Substitutes and Artificial Sweeteners

Replacing fats and sugars with substitutes may help many people who have trouble maintaining weight. In fact, in one 2003 study, people with type 2 diabetes used the artificial sweetener sucralose and a beta-glucan fat replacer (derived from oats) as part of a low-calorie diet. At the end of the four weeks, they achieved better weight, glucose control, and HDL levels than those on a standard diabetic diet.

Fat Substitutes. Fat substitutes added to commercial foods or used in baking, deliver some of the desirable qualities of fat, but do not add as many calories. It should be stressed that eliminating all fats from a diet can be harmful to general health. Some include the following:

- Stanols. Stanols are plant compounds used in margarines (Benecol, Take Control). Benecol is derived from pine bark and Take Control from soybeans. Two servings a day of either brand as part of a low-fat diet can lower LDL and total cholesterol by impairing its absorption in the intestinal tract. Some studies have reported that their use can allow lower doses of statins--cholesterol lowering agents. These products do not appear to block absorption of fat-soluble nutrients or vitamins, as olestra does. They can be hydrogenated, however, and so can contain some trans-fatty acids.
- Olestra (Olean) passes through the body without leaving behind any calories from fat. Studies suggest that it improves cholesterol levels and helps people lose weight when it is used to replace a third of normal dietary fats. (Simply adding snacks containing olestra do not appear to have any effect on cholesterol or weight loss.) Early reports of cramps and diarrhea after eating food containing olestra have not proven to be significant. Of greater concern is the fact that even small amounts of olestra deplete the body of certain vitamins and nutrients that may help protect against serious diseases, including cancer. The FDA requires that the missing vitamins be added back to olestra products, but not other nutrients. The adverse health effects, if any, are unknown.
- Beta-glucan is a soluble fiber found in oats and barley. Products using this substance (e.g., Nu-Trim) may reduce cholesterol and have additional health benefits.

A number of other fat-replacers are also available. Although studies to date are not showing any significant adverse health effects, their effect on weight control is uncertain, since many of the products containing them may be high in sugar.

Artificial Sweeteners. Many artificial or low-calories sweeteners are available. A 2002 study confirmed that people who consumed artificial sweeteners in beverages and foods and reduced their sugar intake weighed less over time than those who ate similar types and amounts of drinks and food containing sugar. It should be noted that using these artificial sweeteners should not give dieters a license to increase their fat intake. Studies indicate that consuming some sugar is not a significant contributor to weight gain as long as the total caloric intake is under control. There is some public concern about chemicals used to produce many of these sweeteners and adverse effects in studies using rats. Natural low-calories sweeteners are available that may be more acceptable to many people.

- Saccharin (Sugar Twin, Sweet n'Low, Sucaryl, and Featherweight). Saccharin has been used for years but is not used as commonly now. Some studies found that large amounts of saccharin cause bladder cancer in rats. Although the rats were fed huge amounts that do not apply to human diets, some evidence suggests that people who have six or more servings of saccharin per day may have an increased risk.
- Aspartame (Nutra-Sweet, Equal, NutraTase). Aspartame has come under scrutiny because of rare reports of neurologic disorders, including headaches or dizziness, associated with its use. People with phenylketonuria (PKU), a rare genetic condition, should not use it. Studies have not reported any serious health dangers, but some people may be sensitive to it.
- Sucralose (Splenda). Sucralose has no better aftertaste and works well in baking, unlike other artificial sweeteners. It is made from real sugar by replacing hydroxyl atoms with chlorine atoms. Some people are concerned because chlorinated molecules used in major industrial chemicals have been associated with cancer and birth defects. Over 100 studies have been conducted on sucralose over a 20-year period with no reports of such risks.
- Acesulfame-potassium (Sweet One, SwissSweet, Sunette). It has been used in the US since 1988 with no reported adverse effects.
- Neotame (Neotame). Neotame is a synthetic variation of aspartame but was developed to avoid its side effects. The association with aspartame has raised some concerns. Studies to date have reported no effects that would cause alarm and it appears to be safe for general consumption.
- D-tagatose (Tagatose). This is a reduced calorie sweetener is a novel low-calorie sweetener derived from lactose, which is found in dairy products and other foods. It may be specifically beneficial for people with type 2 diabetes and have additional benefits that aid the intestinal tract.
- Alitame (Aclame) is formed from amino acids. It has the potential to be used in all products that contain sugar, including baked goods.
- Stevioside (Stevia). This is a natural sweetener derived from a South American plant. It is available in health food stores. People with diabetes should avoid alcohol-based forms. It has not been rigorously tested.

Others being investigated include, glycyrrhizin (derived from licorice), and dihycrochalcones (derived from citrus fruits).

- Resistance, or strength, training is excellent for replacing fat with muscles. It should be performed two or three times a week.
- As people slim down, their initial level of physical activity becomes easier and they burn fewer calories per mile of walking or jogging. The rate of weight loss slows down, sometimes discouragingly so, after an initial dramatic head start using diet and exercise combinations. People should be aware of this phenomenon and keep adding to their daily exercise regimen.
- As people age, they also need to exercise more to keep off the same amount of weight.
- Changes in fat and muscle distribution may differ between men and women as they exercise. Men tend to lose abdominal fat (which lowers their risk for heart disease faster than reducing general body fat). Exercise, however, does not appear to have the same effect on weight distribution in women. In one interesting study women who underwent aerobic and strength training lost fat in their arms and trunk, but did not gain muscle tissue in these regions. On the other hand, they gained muscles but achieved no change in fat mass in their legs.

Warning Note. Because obesity is one of the risk factors for heart disease and diabetes, anyone who is overweight must discuss their exercise program with a physician before starting. Sudden strenuous exercise, in such cases, can be very dangerous.[For more information, *see*Well-*Connecte*d Report #29 *Exercise*.]

Medications

Many of the current drugs used for weight loss are effective, particularly when used appropriately along with additional measures, including exercise and behavioral modification.

The long-term effects of most of these medications have not been established. Most lose their effectiveness over time, thus requiring increased dosage, and some can become addictive. In addition, some of the psychostimulant agents have been associated with an increase in depression, which may be a particular problem, since depression is already common in obesity. (It is unclear if the newer agents, sibutramine and orlistat, have this effect.)

None of these drugs deals with the underlying problems that may be causing obesity. Unless specifically instructed by a physician, people should use non-drug methods for losing weight. Except under rare circumstances, pregnant or nursing women should never take diet medications of any sort, including herbal and over-the-counter remedies.

Over-the-Counter Drugs and Herbal Remedies

A 2001 study reported that 7% of American adults use nonprescription weight-loss products. People must be cautious when using any weight-loss medications, including over-the counter diet pills and herbal or so-called natural remedies. Buying unverified products over the Internet can be particularly dangerous.

Perhaps the best alternative advice for people who are overweight is to drink tea. Studies have indicated that regular tea drinking is associated with lower weight, particularly in people who drink it for years. Green tea specifically has been associated with increased energy expenditure. One study reported that people who took a green tea extract (Exolise) lost weight and reduced their waist size. Better evidence is needed, however, to confirm the results on this supplement.

Thermogenic Approach to Weight Loss. An approach to weight loss called thermogenic (also hepatothermic) therapy is based on the idea that certain natural compounds have properties that enable the liver to increase energy in the cells and stimulate the metabolism. Theoretically, the result would be fat loss. Among the natural substances used in such products are EPA-rich fish oil, sesamin, hydroxycitrate, pantethine, L-carnitine, pyruvate, aloe vera, aspartate, chromium, coenzyme Q10, green tea polyphenols, aloe vera, DHEA derivatives, cilostazol, diazoxide, and fibrate drugs.

Nearly all the current over-the-counter dietary aids contain some combination of these ingredients. There is no evidence that any of these ingredients can produce weight loss, and some may even have harmful effects.

Chromium, for example, is a common ingredient in many diet supplements (e.g., Xenadrine, Dexatrim, Acutrim Natural, Twinlab Diet Fuel). It is claimed to specifically promote fat loss, rather than lean muscle loss. Some evidence suggests that niacin-bound chromium may improve insulin sensitivity. On the negative side, animal studies have suggested that chromium may have damaging effects on genetic materials in cells that theoretically could promote sterility.

Orlistat (Xenical)

Orlistat (Xenical) can help about one-third of obese patients with modest weight loss, and can assist in long-term maintenance of weight loss. It works by inhibiting the absorption of body fat (by about 30%) in the intestine. Studies indicate that between 50% and 80% of patients can achieve weight loss of 5% or greater, depending on other lifestyle changes. It does not work for all patients, however. In one survey of patients who took it, 10% *gained* weight or did not lose any and 43% lost less than 5%. Nevertheless, orlistat may delay or even prevent the onset or progression of diabetes and improve cholesterol levels, regardless of weight loss.

The drug can cause gastrointestinal problems and may interfere with absorption of the fat-soluble vitamins A, D, and E and other important nutrients. The most unpleasant side effect is oily leakage of feces from the anus. Restricting fats can reduce this effect. People with bowel disease should probably avoid it. In spite of these side effects, most patients are able to tolerate this agent.

Sibutramine (Meridia)

Sibutramine (Meridia) keeps two important brain chemicals, serotonin and norepinephrine, in balance, which helps to increase metabolism. It causes a feeling of fullness and increases energy levels. It may be particularly useful for binge-eaters. Studies indicate that sibutramine is effective in achieving weight loss, although it slows considerably after the first three months. The agent also appears to improve cholesterol and lipid levels and have other effects that may benefit the heart.

Side effects are common. They include dry mouth, constipation, and insomnia, and in one study almost half the patients dropped out because of them. There have been reports of increases in heart rate and blood pressure, although a 2001 study indicates that blood pressure stabilize over time. At this time, people who have a history of high blood pressure, stroke, heart disease, or arrhythmias should not take this drug. People taking decongestants, bronchodilators (such as for asthma), monoamine oxidase inhibitors, or serotonin reuptake inhibitors should also avoid sibutramine.

Psychostimulants

Phentermine and Other Sympathomimetics. Sympathomimetics are agents that act like the neurotransmitter norepinephrine (a stress hormone) and act as stimulants in the brain. Some are approved for treating obesity, but only for short-term use. They include

phentermine (Ionamin, Adipex, Fastin), benzphetamine (Didrex), and phendimetrazine (Adipost, Bontril, Melfiat, Plegine, Prelu-2, Statobex). Phentermine is the most commonly prescribed appetite suppressant and is less expensive than orlistat or sibutramine. Its effects are not long lasting, however. Any sympathomimetic can raise blood pressure. In addition, such drugs are associated with depression, which is already a problem in many cases of obesity. A combination (Phen-Pro) containing phentermine and the antidepressant fluoxetine (Prozac) is being investigated to help reduce this problem. Note neither phentermine nor such combinations are associated with the heart problems linked to the previous phentermine combination with fenfluramine (Fen-Phen).

Amphetamines. The amphetamines dextroamphetamine (Dexedrine), methamphetamine (Desoxyn), and phenmetrazine (Pleudin) are powerful stimulants. They were used most often in the past but are no longer prescribed for weight loss. These drugs elevate mood and produce some modest weight loss over the short term, but present serious risks of addiction, agitation, and insomnia.

Investigative Agents

Rimonabant. Rimonabant (Accompli) belongs to a new class of drugs called selective CB1 blockers. The drug is designed to inhibit receptors in the brain's endocannibinoid system that are associated with food consumption regulation. Rimonabant also targets receptors in adipose (fat) tissue. In late phase findings presented at the 2004 European Society of Cardiology conference, researchers reported that obese patients treated with 20 mg of rimonabant experienced significantly more weight loss and waist circumference reduction than patients who received placebo. The drug also appeared to have beneficial effects on raising HDL ("good" cholesterol) levels. If further trials are positive, rimonabant could become commercially available in 2006.

Ciliary Neurotrophic Factor. An agent derived from ciliary neurotrophic factor (Axokine) signals the brain to suppress appetite. It is proving to be effective in achieving weight loss, and also improves cholesterol, lipid, and glucose levels regardless of food intake. The agent, then, may be particularly helpful for people with type 2 diabetes. It is currently in late trials.

Zonisamide. Zonisamide (Zonegran) is an anti-seizure agent that is also being investigated for weight loss. In one study, patients who took it lost more weight than those on placebo. Zonisamide increases the risk for kidney stones, which can be reduced with increased fluid intake and citrate. It has also been associated with reduced sweating and a sudden rise in body temperature, especially in hot weather. Other side effects include dizziness, forgetfulness, headache, and nausea.

Topirimate. Topirimate (Topamax) is another anti-seizure medication being investigated for weight reduction. Three clinical trials have reported that patients given topirimate lost more weight than those receiving placebo. Weight loss was sustained for up to one year. The drug is also being studied for binge-eating disorders associated with obesity.

Note on Fenfluramine

Phentermine was one part of the agent fen-phen, which also contained fenfluramine. Fenfluramine (Pondimin) and a similar drug dexfenfluramine (Redux) were taken off the market after reports showed they caused development of abnormalities in the valves of the heart and, in rare cases, pulmonary hypertension. Phentermine does not appear to have adverse the adverse effects of these other drugs. (Of concern, fenfluramine has been found in some products, notably Chaso Diet Capsules and Chaso Genpi that are sold in the US as alternative diet remedies.)

Other Treatments

Surgical procedures for obesity (also called bariatric surgery) may be appropriate for some dangerously obese people and may reduce heart problems and many of their risk factors, including high blood pressure, sleep apnea, and diabetes. In fact, some evidence suggests that surgery may provide much greater control of weight and diabetes than nonsurgical weight-loss methods. Studies are reporting significant reductions in diabetes and need for diabetic medications. Other medical conditions that often improve after surgery include heartburn, arthritis, and other joint and circulation problems.

Bariatric surgeries produce weight loss through one of two approaches:

- Restrictive Banding Procedure. These procedures restrict the amount of food by closing off parts of the stomach with bands.

Warnings on Some Ingredients in Over-the-Counter Diet Products

Ephedra, Ephedrine, and Ma Huang. The FDA does not allow the sale of drugs that contain ephedrine. Furthermore, as of May 2004, the FDA does not allow that sale of dietary supplements that contain ephedra (also called Ma Huang). These are all essentially the same compound, and they have been linked to serious side effects and are considered too risky to use.

Conjugated Linoleic Acid (CLA). Conjugated linoleic acid is found in many dietary products (e.g., Biosculpt Liquid, Body Success, GNC Optibolic Body Answers Dietary Formula). There is no evidence that it produces weight loss. Furthermore, there is some concern that CLA might increase insulin resistance and a dangerous inflammatory response in people with obesity.

Tiratricol. Over-the-counter products containing tiratricol, a thyroid hormone, have been sold for weight loss. Such products may increase the risk for thyroid disorders, heart attack, and stroke.

Laxative Actions in Natural Substances. Many dietary herbal teas contain laxatives, which can cause gastrointestinal distress, and, if overused, may lead to chronic pain, constipation, and dependency. In rare cases, dehydration and death have occurred. Some laxative substances found in teas include senna, aloe, buckthorn, rhubarb root, cascara, and castor oil.

Guar Gum. Some fiber supplements containing guar gum have also caused obstruction of the gastrointestinal tract.

Chitosan. Chitosan, a dietary fiber from shellfish, prevents a small amount of fat from being absorbed in the intestine. Well-conducted studies, however, have not found it to be effective. Products containing it include Cheat & Lean Fat Blocker, Natrol, CHroma Slim, and Enforma. People who are allergic to shellfish should not take these supplements.

Plantain. Dietary remedies that list the ingredient plantain may contain digitalis, a powerful chemical that affects the heart. (This should not be confused with the harmless banana-like plant also called plantain.)

- Malabsorptive Bypass Procedures. This approach restricts the amount of food and also reduces absorption by using a by-pass of parts of the intestine.

The malabsorptive procedures are more successful in achieving weight loss than the banding approach, but they carry a greater risk for nutritional deficiencies.

Benefits of Bariatric Surgery

Most people lose about two-thirds of excess weight within two years. In addition, often diseases associated with obesity improve (e.g., diabetes, high blood pressure, sleep apnea, joint pain, and incontinence). The majority regains about to 10% of their weight, although most maintain significant weight loss. Failure can still occur if people cheat the procedure by eating frequent small meals of liquid or soft foods. Patients must still develop a healthy life style and be calorie conscious after the operation. Follow-up must be life long.

Candidates for Bariatric Surgery

Any surgical candidate must have failed consistently in losing weight through less invasive methods. Experts recommend bariatric surgery only for the following:

- Those whose BMI is above 40 (about 100 pounds overweight), and or
- Those with BMIs of over 35 who have type 2 diabetes or serious obesity-related medical problems at least 35 or more or whose weight is about 85 to 100 lb. more than ideal, and or
- Those with severe obesity that interfered with employment, normal physical activity (e.g., walking), and important relationship.

Restrictive Banding Procedures

About a third of people who undergo these procedures achieve normal weight and 80% experience some weigh loss. They are less successful than the by-pass procedures but cause a lower risk for nutritional deficiencies.

Vertical Banded Gastroplasty. Vertical banded gastroplasty (VBG) was the most common restrictive procedures. It involves creating a hole through both stomach walls and sealing the edges with a staple. This narrows the stomach, similar to a funnel, and allows only small amounts of food to pass through.

Laparoscopic Gastric Banding. Laparoscopic gastric banding (the Lap-Band) usually does not require a major incision and avoids some of the major complications of gastric bypass:

- It employs an adjustable silicone band that is placed around the upper part of the stomach.
- A small balloon-like reservoir attached to the band under the abdominal skin contains saline, which can be added or removed to tighten or loosen the band.
- The procedure restricts the amount of food a person can eat and gives the feeling of fullness.

The band is removable, if necessary. Studies to date indicate that the intestinal tract returns to normal afterward. Some studies have reported significant weight loss and improved quality of life with the procedure, including in the elderly. A 2001 analysis of eight US centers where it was performed, however, reported a very high failure rate after two years. Experts concluded that it is not, at this time, an effective procedure for severe obesity. Nevertheless, increasing surgical experience could improve these results.

Malabsorptive Bypass Procedures

Malabsorptive procedures produce greater weight loss than restrictive procedures. They generally achieve about two-thirds of their weight loss within two years. Furthermore, in a 2003 study, after standard bypass surgery, 83% of patients with type 2 diabetes experienced normal blood glucose levels and the rest had significant reductions.

Roux-en-Y Gastric Bypass Procedure. This is the most successful malabsorptive surgery. It involves creating a small stomach pouch that serves as a reservoir and restricts food intake. The pouch eventually holds up to 3 ounces of food and has a small outlet that delays emptying and causes a feeling of fullness. Then the surgeon creates a Y-shaped section in the small intestine that attaches to pouch and allows food to bypass the lower stomach and upper part of the intestine. One 2003 study reported that it was associated with significant weight loss, and furthermore 80% of patients with type 2 diabetes were able to reduce their medications.

The procedure produces greater and more sustained weight loss than banding procedures, but also it is more complicated and carries a higher risk for nutritional deficiencies. Laparoscopy techniques, which are less invasive, are showing promise for possibly reducing complications.

Biliopanctreatic Diversion. This procedure is more complicated and removes portions of the stomach. The pouch that is created attaches directly to the lower part of the small intestine. It poses a higher risk for nutritional deficiencies than other procedures and is not used as often.

Spot Reduction

Spot Exercising. Anyone seeking to lose weight must expect that the results may not be as cosmetically satisfying as one would wish. Spot exercising, training particular areas of the body, is ineffective in reducing fat in specific locations because exercise draws on fat stores throughout the body. Gimmicky devices such as bust developers, vacuum pants, and exercise belts do absolutely nothing to reduce fat in specific locations or, in the case of the bust developer, to add bulk. Electrical pads wrapped around the waist, arms, or thighs were reported to cause burns and fires.

Cellulite-Removal Creams. Many women try to reduce fat in their thighs (cellulite) with creams that contain aminophylline (Skinny Dip, Thermojetics Body Toning Cream, Smooth Contours). Studies provide no evidence that these creams are effective. Their apparent effect on fat may simply be from constricting blood vessels and forcing water from the skin, which could be dangerous for people with circulation problems.

Endermologie. Endermologie uses motorized rollers and regulated suction to smooth out cellulite. In one study, about 28.6% of patients reported improved appearance after using it.

Liposuction. Liposuction eliminates fat in specific areas, such as the abdomen, thighs, buttocks, or knees. Special instruments are inserted through the skin into the pockets and suction is used to move the fat, break it up, and remove it. Small tubes may be used to drain blood and fluid during the first few days. The pain after the operation can be severe and often the skin does not contract, resulting in a flabby look. Complications can include burns from the vibrators, bruising, blood clots, and bleeding. Weight gain generally tends to develop in other locations after the operation. Some physicians are using this procedure in overweight people with diabetes to remove abdominal fat. Although there is no proof that it has an effect on diabetes, some experts believe it warrants some attention.

Side Effects and Complications

General Side Effects and Complications. Side effects and complications of bariatric procedures are common, and up to 25% of patients require corrective or repeat procedures. After any of these procedures people must chew all their food carefully and cannot eat large amounts of food at one time or they will experience nausea, abdominal distress, or both.

Complications from any bariatric procedure includes the following:

- Vomiting is the most common, with banding procedures causing a greater risk.
- There is a strong risk for nutritional deficiencies, particularly with malabsorptive operations. This can lead to anemia and increase the risk for bone loss and osteoporosis. Sufficient mineral and vitamin supplements are important.
- There is a significant risk for deep-vein thrombosis (blood clots).
- Abdominal hernia is a common complication. (Newer, laparoscopic technique can avoid this problem, but not all individuals are candidates for this less invasive approach.)
- Rapid weight loss after surgery puts people at high risk for gallstones.
- Women who wish to be pregnant should wait until their weight has stabilized. Rapid weight loss and nutritional deficiencies can harm the fetus.

People at highest risk for complications are those with heart or lung problems, severe obesity, and a history of abdominal surgeries. Mortality rate from bariatric surgeries is 0.2%, which is lower than the morality rates from morbid obesity itself. Other variations and less invasive techniques using laparoscopy are being developed.

Specific Complications of Restrictive Banding Procedures. Nausea, vomiting, or both in half the patients and severe heartburn in a third. Device-related complications include band slippage, pouch dilation, or both in nearly a quarter of patients and obstruction in 12%. Very serious complications are rare, but include blood clots, bleeding, infection, pneumonia, and perforation of the stomach.

Specific Complications of Malabsorptive Bypass Procedures. Vomiting often occurs. Nutritional deficiencies occur more often in these procedures. The so-called dumping syndrome is a common unpleasant side effect that occurs when food waste moves too quickly through the intestine. Symptoms include nausea, weakness, sweating, and faintness (particularly after eating sweets).

Resources

- www.healthierus.gov/dietaryguidelines -- Dietary Guidelines for Americans 2005
- www.naaso.org -- North American Association for the Study of Obesity
- www.eatright.org -- American Dietetic Association
- www.nutrition.gov. -- Nutrition.gov
- www.asbs.org -- American Society for Bariatric Surgery
- www.usda.gov/cnpp -- Center for Nutrition Policy and Promotion
- www.nal.usda.gov/fnic--Food and Nutrition Information Center
- www.americanheart.org -- American Heart Association
- www.nationaleatingdisorders.org -- National Eating Disorders Organization
- www.aabt.org--Association for Advancement of Behavior Therapy
- www.fda.gov -- Food and Drug Administration
- http://win.niddk.nih.gov--Weight-Control Information Network
- www.overeatersanonymous.org -- Overeaters Anonymous

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