

Journal of the Health Resource Center

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Publisher: Renee Twigg, P.H.N., M.S., Director of the Student Health Services
Production: Victor Cannon
Editor-in-Chief: Ming-Yu Cheng, M.D., M.P.M.
Assistant Editor: Yumiko N. Lee
Copy Editor: Brant Burkey and Linda Pena
Contributing Editors: Dannie Allen, Heidi Burkey, Kristen Force, Yumiko Lee, and Noemi Orozco
Design/Illustrator: Jui-Ping Ruby Yu

Comments and suggestions are welcome.
Address letter to the Health Resource Center,
1250 Bellflower Blvd. Long Beach, CA 90840.
www.csulb.edu/centers/shc/hrc
hrc@csulb.edu

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Editorial Report

Ming-Yu Cheng., M.D. M.P.M.
Coordinator, Health Resource Center

Physical health is a vital component for an overall state of well-being. The advantages of a strong, healthy body are limitless and begin with proper nutrition and exercise. Unfortunately, such a fundamental need as food creates considerable difficulties for many Americans. Pressure from the media, food service establishments, and family and friends can push people to such extremes as excessive “overeating” to severe “undereating”. *The Journal of the Health Resource Center* has chosen to address this serious and widespread issue because of its prevalence during these college age years and to stress the importance of developing healthy eating habits early in life.

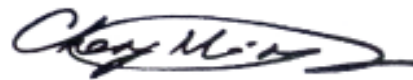
Although a vast majority of adult Americans state that weight loss or weight maintenance is a major concern, one in two are overweight or obese. Adolescents face an even more serious challenge, in that for them, the concern of obesity is statistically shown to increase faster than in any other age group. Overweight individuals raise their chances of suffering from chronic physical ailments, such as heart disease, stroke, type-2 diabetes, and even cancer. The gravity of this issue is evidenced by the fact that more than 300,000 adults in the United States die each year from obesity-related causes.

Therefore, overweight Americans are seeking healthy solutions. Increasing lean tissues, such as muscle and bone, is significantly more beneficial than just losing weight. Gradual lifestyle changes in exercise and nutrition will produce the best, and most sustainable results. Before consuming any supplements that promise instantaneous results, it is necessary to thoroughly research the products. All too often weight reduction supplements that seem ‘too good to be true’

may actually place a person’s health at even greater risk.

Obvious contradictions abound as people are repeatedly told thinness is a desirable attribute to achieve, while simultaneously being inundated with foods high in fat and calories. Society does not cast underweight individuals in the same negative light as those who are overweight, but the consequences can be equally dangerous. Adding to the physical health concerns, many people with eating disorders also suffer from mental and emotional instabilities. Models who once weighed 8% less than the average woman have dwindled to 23% less, and many Americans are striving to achieve the same unattainable result.

Education is a step towards combating these health risks. Gaining an understanding of how the body processes food and the amounts of food that are needed can have a beneficial effect on nutritional choices. These positive lifestyle choices will ultimately assist Americans in achieving their best weight for good health.



Body Composition and Your Health

Yumiko N. Lee

Maintaining a proper weight is essential for an effective lifestyle. Being too fat or too thin can lead to numerous health problems. Currently, many popular diets target weight reduction, rather than body composition improvement, which leads people to try to lose weight and increase muscle mass by means other than proper exercise and healthy eating. However, there are increasingly accurate methods now available to determine a person's healthy body weight and composition, such as height-weight charts, weight-for-height charts, body mass index (BMI), or body composition measurements, which can reveal a person's overall health and highlight potential health risks. There are no miracle solutions for improving body composition. However, properly attaining a positive body composition can promote healthy living and prevent chronic health risks while enjoying good health.

Everyday choices define lifestyle and can significantly affect body weight. Being too fat or too thin increases the likelihood for developing health problems. What is a healthy weight? This question can be answered with general guidelines developed by researchers who are continuing to discover precise ways to define an individual's weight. By maintaining sensible eating behaviors and regular exercise, a person can achieve a favorable weight that will help prevent chronic health risks. Another important health factor is fat. For a healthy body, it must be determined how much of your weight is fat, where in your body the fat is located, and whether you have weight-related medical problems.

Recent estimates suggest that over half of the adults in the United States are overweight or obese, an increase of more than 25% over the past three decades.¹ According to the third National Health and Nutrition Examination Survey, it is estimated that the number of overweight or obese adults is as high as 97 million.² This is significant because the estimated total annual cost attributed to obesity-related diseases in the U.S. nearly tops \$100 billion, and an estimated 300,000 U.S. adults die of causes related to obesity each year.^{2,3} The U.S. Department of Health and Human Services states that there is a direct correlation between higher body weights and higher death rates.²

In other words, statistics suggest that being overweight or obese substantially impairs quality of

life, contributes to preventable disease, and increases morbidity.^{3,4,5} To combat these problems, the national health promotion and disease prevention initiative, Healthy People 2010, has set the goal of maintaining a healthy weight as one of the most important ways to improve both quality and length of life.⁶

Although the rate of overweightness and obesity has increased steadily in the past 30 years, studies show that weight loss is a major health concern for most adults who are trying to lose or maintain weight.⁷ For guidance on this subject, the following article will discuss some of the various methods for measuring healthy weights, including height-weight charts, weight-for-height charts, body mass index (BMI), or body composition. Additionally, several means for improving body composition and maintaining a healthy weight will be presented.

Height-Weight Charts

Many health and life insurance companies recognized years ago that weight increases were directly related to increased morbidity and mortality; therefore, they pooled the data to create charts to define body weight in relation to health risk and estimated longevity.^{5,9,10-13} Height-weight charts have largely been used to identify insureds' level of wellness among insurance companies (Figure 1,2). This chart does not reflect current weight and mortality relationships for the American

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population, since the deaths reflect the mortality of policyholders only with a cutoff date of 11 years prior to the publication of the tables. Moreover, the table does not provide information on body fat distribution or degree of obesity.¹⁴ However, many health care professions have used the charts for many years as standardized information to recognize the clients' approximate degree of risk and to guide treatment.

On the other hand, the fifth edition of *Nutrition and Your Health: Dietary Guidelines for Americans*, which is a joint publication of the Departments of Health and Human Services(HHS) and Agriculture (USDA), was released on May 30, 2000, to provide accurate and reliable advice for preventing obesity using what they called weight-for-height charts, a variation on the traditional height-weight charts. The Dietary Guideline is coordinated by the Office of Disease Prevention and Health Promotion, HHS, USDA, and the Center for Nutrition Policy and Promotion. This advisory committee also provided to consumers the standard height-weight charts categorizing healthy weight, moderate overweight, and severe overweight so they could recognize their own state of health(Figure 3).^{15, 16}

Height-Weight Chart for Women*

Height	Small Frame	Medium Frame	Large Frame
4'10"	102-111	109-121	118-131
4'11"	103-113	111-123	120-134
5'0"	104-115	113-126	122-137
5'1"	106-118	115-129	125-140
5'2"	108-121	118-132	128-143
5'3"	111-124	121-135	131-147
5'4"	114-127	124-138	134-151
5'5"	117-130	127-141	137-155
5'6"	120-133	130-144	140-159
5'7"	123-136	133-147	143-163
5'8"	126-139	136-150	146-167
5'9"	129-142	139-153	149-170
5'10"	132-145	142-156	152-173
5'11"	135-148	145-159	155-176
6'0"	138-151	148-162	158-179

Figure 1.

*Weight in pounds, based on ages 25-59 with the lowest mortality rate (indoor clothing weighin 5 pounds and soes with 1' heels)

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Height-Weight Chart for Men*

Height	Small Frame	Medium Frame	Large Frame
5'2"	128-134	131-141	138-150
5'3"	130-136	133-143	140-153
5'4"	132-138	135-145	142-156
5'5"	134-140	137-148	144-160
5'6"	136-142	139-151	146-164
5'7"	138-145	142-154	149-168
5'8"	140-148	145-157	152-172
5'9"	142-151	148-160	155-176
5'10"	144-154	151-163	158-180
5'11"	146-157	154-166	161-184
6'0"	149-160	157-170	164-188
6'1"	152-164	160-174	168-192
6'2"	155-168	164-178	172-197
6'3"	158-172	167-182	176-202
6'4"	162-176	171-187	181-207

Figure 2.

*Weight in pounds, based on ages 25-59 with the lowest mortality rate. (indoor clothing weighing 5 pounds and shoes with 1' heels)

Weight-for-Height Chart

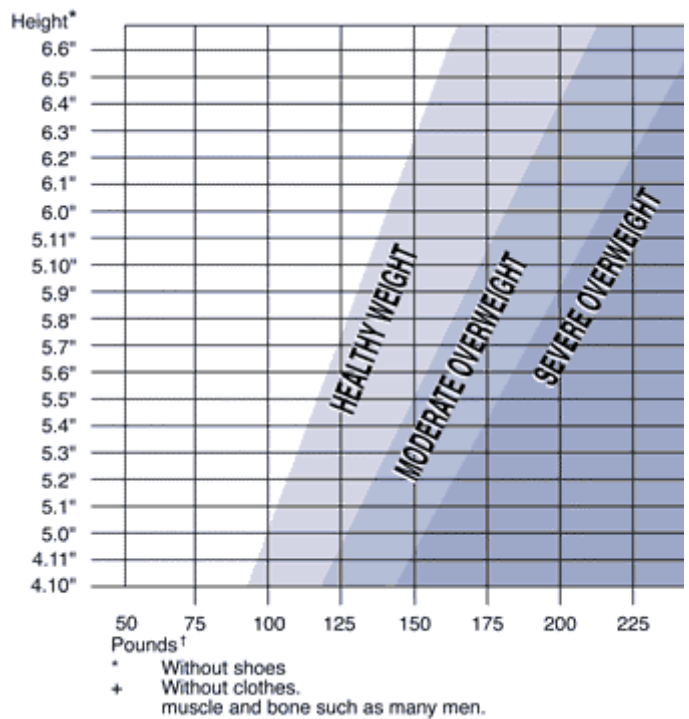


Figure 3

Source: Report of the Dietary Guidelines Advisory Guidelines for Americans, 1995

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What is BMI?

Body Mass Index (BMI) is the categorized number that tells a person if they are overweight or obese based on his or her height and weight. It is calculated by dividing body weight in kilograms (kg) by height in meter squared (m²).¹⁷ According to the National Heart, Lung, and Blood Institute, overweight is defined as a body mass index (BMI) of 25 to 29.9 kg/m² and obesity as a BMI of >30kg/m² as shown in Table 1.^{2,8}

In 1998, an expert panel from the National Institute of Health recommended that BMI be used to classify overweight and obese, despite most clinicians' claims that they do not have enough time to calculate patients' BMI values. To estimate BMI using pounds and inches, use [weight (pound) / height (inches)²] x 703 as indicated in Table 2. It is recommended that health professionals use BMI to determine weight condition of patients because it is well established that excess body fat is associated with hypertension, type 2 diabetes, and

hyperlipidemia^{12,18}, and it is important to evaluate their patients based not only on their weight, but height also. The BMI value is more accurate to assess body composition than using a height–weight chart. There are some standard errors of estimating percent body fat from BMI (~5% fat)¹⁹, particularly for people with a high muscle mass, since the connective tissue is usually three times heavier than the adipose tissue. Based on a comparative analysis of the basic weight and height relativity test, it has been suggested that BMI is both highly correlated with weight and consistently independent of height. The demonstration of such a relationship between BMI and body weight makes BMI a good choice for the anthropometric assessment of adult weight status and the index of choice for epidemiological purposes.²⁰ BMI also has the advantage of being an index that has been reported in the literature over the past century, providing an excellent foundation for comparative purposes.^{15,21-27}

Weight Classification by body Mass Index (BMI)

<i>NHLBI Terminology (NHI)</i>	<i>BMI, kg/m², Range</i>	<i>WHO Classification</i>
Underweight	<18.5	Underweight
Normal	18.5 – 24.9	Normal Range
Overweight	25.0 – 29.9	Preobese
Obesity I	30.0 – 34.9	Obese I
Obesity II	35.0 – 39.9	Obese II
Obesity III	>40.0	Obese III

Table 1

*NHLBI indicates National Heart, Lung, and Blood Institute and WHO, World Health Organization.

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Determining body composition

Body composition and body weight are two entirely different concepts, and they are not interchangeable. The human body is composed of a variety of different tissue types. The lean tissues, such as muscle, bone, and organs, are metabolically active while adipose tissues are not. Body composition refers to the relative percentage of body weight that is fat and fat free tissue.

Lean mass often determines the basal metabolic rate (BMR); the higher BMR makes the body energetic and feel healthy. Thus, a healthy lifestyle can be established not when someone loses weight, but rather increases the lean mass ratio in the body. Many clinical professionals have for their practical convenience used height-weight charts, or BMI as traditional measuring tools of understanding the standard weight, as opposed

Selected BMI Units Categorized By Inches (cm) and pounds (kg)

<i>Height in inches (cm)</i>	<i>BMI 25kg/m² Body weight in pounds (kg)</i>	<i>BMI 27kg/m² Body weight in pounds (kg)</i>	<i>BMI 30 kg/m² Body weight in pounds (kg)</i>
58 (147.32)	119 (53.98)	129 (58.51)	143 (64.86)
59 (149.86)	124 (56.25)	133 (60.33)	148 (67.13)
60 (152.40)	128 (58.06)	138 (62.60)	153 (69.40)
61 (154.94)	132 (59.87)	143 (64.86)	158 (71.67)
62 (157.48)	136 (61.96)	147 (66.68)	164 (74.39)
63 (160.02)	141 (63.96)	152 (68.95)	169 (76.66)
64 (162.56)	145 (65.77)	157 (71.21)	174 (78.93)
65 (165.10)	150 (68.04)	162 (73.48)	180 (81.65)
66 (167.64)	155 (70.31)	167 (75.75)	186 (84.37)
67 (170.18)	159 (72.12)	172 (78.02)	191 (86.64)
68 (172.72)	164 (74.39)	177 (80.29)	197 (89.36)
69 (175.26)	169 (76.66)	182 (82.56)	203 (92.08)
70 (177.80)	174 (78.93)	188 (85.28)	207 (93.89)
71 (180.34)	179 (81.19)	193 (87.54)	215 (97.52)
72 (182.88)	184 (83.46)	199 (90.27)	221 (100.25)
73 (185.42)	189 (85.73)	204 (92.53)	227 (102.97)
74 (187.96)	194 (88.00)	251 (95.26)	233 (105.96)
75 (190.50)	200 (90.72)	216 (97.98)	240 (108.86)
76 (193.04)	205 (92.99)	221 (100.25)	246 (111.58)

Table 2.

*Sources: National Institutes of Health: National Heart, Lung, and Blood Institute, Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults, The Evidence Report.

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to body composition.³⁰ However, only body composition measurement provides information about fat distribution and location, as well as the ratio of fat and lean body mass.¹⁷

In recent years, the decline in lean body mass has become one of the most important areas of understanding weight issues in the United States, since recent estimates suggest that 1 in 2 adults is overweight or obese.¹ Although body composition estimates for the U.S. population are important in order to analyze trends in obesity, national body composition estimates have not previously been available.²⁸ Many scientists have been studying body composition, but research has increased dramatically in the last 25 years as methods for measuring and analyzing the body have grown in accuracy. By measuring body composition, a person's health status can be more accurately assessed and the effects of both dietary and physical activity programs better directed.

The most reliable and accurate way of measuring body composition is the post mortem autopsy, when the exact ratio of lean and fat mass can be determined. "In Vivo" techniques are those performed on living subjects, but which only yield an estimated body composition. According to the National Institute of Health, there are many methods for measuring body composition, but there is no trial data to indicate that one method is better than any other. Most research studies employ several methods used in combination.²⁹

How to assess body composition?

Anthropometry and Densitometry are the two methods of choice for estimating body composition in the clinical setting. The methods

can be accurate, and require little time, space, equipment, or financial outlay.

Although used extensively in epidemiological research, height or weight indices (BMI) are not as accurate as skin fold and circumference measures for estimating body composition. The validity of estimating body density is enhanced by using a combination of skin fold and circumference measurements in a multiple-regression model.³¹ The various methods for measuring body composition have been described in the Thirtieth Annual Meeting of the American College of Sports Medicine (ACSM) held in Montreal, Quebec, May 18-21, 1983. Among these techniques, the most commonly used are hydrostatic weighing and anthropometry. Although many consider the hydrostatic weighing technique as the gold standard for use in laboratory investigation, its broad practical use in the clinical setting is limited.³²

The Densitometry technique is used to determine whole body density, using the ratio of body mass to body volume. In this technique, which has been used as a reference or criterion standard for assessing body composition, the body is divided into two components: the fat mass and the fat-free mass. Body volume can usually be measured by hydrostatic weighing. This technique of measuring body composition is based on Archimedes' principle, which states that when a body is immersed in water, it is buoyed by a counterforce equal to the weight of the water displaced. This loss of weight in water, corrected for the density of water, allows calculation of body volume. Bone and muscle tissue are denser than water, whereas fat tissue is less dense. Therefore, a person with more fat-free mass for the same total body mass weighs more in water and has higher body density and a lower percentage of body fat.¹⁷

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The estimation of body composition by anthropometry has been developed in several ways. First, height/weight indices have been used to determine the degree of what is under/overweight. As we discussed above, BMI is widely used to assess body composition; however, it is not the best way to determine body composition.

Second, body composition can be determined from skin fold fat measurement. It has been extensively used among exercise physiologists. The principle of this technique is that the amount of subcutaneous fat is proportional to the total amount of body fat.³³ The ACSM states that skin fold measurements, when performed by a trained, skilled tester, are up to 98% accurate.¹⁷ Also, the National Health and Nutrition Examination Survey (NHANES) shows that the skin fold measurement is a relatively good method after conducting it on a large sample of both sexes throughout the country.³⁸

Third, the waist-to-hip circumference ratio (the circumference of the waist divided by the circumference of the hips) has been used as a simple method for determining body fat patterns.³⁴ The pattern of body fat distribution is recognized as an important predictor for the health risk of obesity. Individuals with more fat in the trunk, especially abdominal fat, have an increased risk of hypertension, type 2 diabetes, hyperlipidemia, coronary artery disease, and premature death, compared with individuals who are equally fat, but have more of their fat in other locations.³⁵ The use of skin fold fat measurement and waist-to-hip circumference ratio are usually measured in combination to increase better estimation of body density or percent body fat.³²

Finally, bioelectrical impedance analysis (BIA) is another, highly controversial method of assessing body fat percentage. It is a new methodology used primarily in a research or clinical setting, but one for which more research is needed before it can be recommended generally. BIA is an easy-to-administer, noninvasive, and safe method of assessing body composition in a fitness setting. It involves passing a small, electrical current through the body and measuring the impedance or opposition to current flow.³⁶ Fat free mass is a good conductor of electricity, whereas fat is not. The resistance to current flow is thus inversely related to fat-free mass and total body water, both of which can be predicted by this technique.¹⁷

The practice of using anthropometric measures for estimating body composition is well established.³² Reviews of numerous studies have shown that skin fold fat and circumference measurements are more valid predictors of body density than combinations of height and weight.³⁷ The gold standard of body composition analysis among physiologists is hydrodensitometry (Figure 3). Nonetheless, because it is time-consuming, complicated and difficult to handle, most physiologists recommend skin fold fat (Figure 4) measurement as an acceptable, alternative means of assessment to hydrodensitometry. The validity of five practical methods assessing body fat is summarized in Table 3, with skin fold fat measurement and bioelectrical impedance being rated the best, and near infrared interactance and body mass index rated the least useful.³⁸⁻⁴⁰

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How can you improve your body composition?

Improving body composition means to reduce fat mass and increase fat-free mass. Reduction of total daily caloric intake results in weight loss regardless of the macronutrient composition.¹⁶ However, weight loss represents only scale measurement reduction, not a reduction of fat mass. You may lose your fat-free mass by restricting your caloric intake, but it is important to understand that certain amounts of body fat are required to perform the normal physiological and metabolic functions. Many popular diets target weight reduction, rather than body composition improvement, even though enhancement of your health is very closely related with a good body composition.

How can you improve your body composition? While we hardly increase bone mass after the growing period, muscle growth is the key to improve body composition. Muscle growth is a complicated process that is determined by hormonal factors and exercise.⁴¹

First, most health experts recommend a combination of a reduced-calorie diet and increased physical activity for weight loss.⁴³ Increasing the exercise habit will definitely improve body composition by increasing the muscle mass and basal metabolic rate (BMR), and by reducing the fat mass. Basal metabolic rate is the amount of energy expended to maintain basic and essential physiological functions. Therefore, muscular individuals have higher BMR because the fat-free mass is more metabolically active. To achieve the appropriate body composition, it is recommended to reduce weight and increase

muscle mass, by exercising and eating less calories than are required for BMR in order to not store excess fat.

It is easy to calculate how much you need to consume when you identify your target weight and understand that one pound of fat is equal to about 3500 kilocalories (Kcals).⁴⁴ According to The Surgeon General's Call To Action To Prevent and Decrease Overweight and Obesity, less than 1 in 3 U.S. adults gets the recommended amount of physical activity. Adherence to regular exercise regimens is also very low in the United States.¹⁷



Figure 3. Hydrostatic weighing

Figure 4. Skin Fold



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Table 3. Rating of the validity and objectivity of body composition methods.

Method	Precise	Objectives	Accurate	Valid equations	Overall
Body Mass Index	1	1	4,5	4,5	4
Near Infrared Interactance	1	1,2	4	4	3.5
Skin Folds	2	2,3	2,3	2,3	2.5
Bioelectric Impedance	2	2	2,3	2,3	2.5
Circumference	2	2	2,3	2,4	3.0

1=Excellent, 2=Very Good, 3=Good, 4=Fair, 5=Unacceptable

Precise refers to the repeatability of the method in the hands of the same investigator over several trials. Objectivity refers to the comparability of the method between investigators. Accurate refers to the criterion-related validity or the comparability of a method with an accepted reference method or criterion method. Finally, valid equations means equations that have been published on a given population using a giving method, have been cross-validated on other samples of the population, and found effective. (36)

To understand why people sometimes lack the motivation for regular physical activity, one must first recognize a simple, yet important, fact: that exercise is voluntary and time-consuming. Learning and changing behavior are very difficult and require a clear understanding of multiple factors that influence learning potential. Cultural beliefs, practices, prior experiences, and knowledge all exert strong influences on health-related behaviors. Subsequently, asking diverse cultures to commit to a “healthy”, low-fat diet may be confusing and largely unsuccessful.⁴⁵ Also, generally accepted principles of learning indicate that adults only learn when they are ready.^{46,47}

Supplement to improve your body composition

Over-the-counter (OTC) weight control drugs are not controlled by the Food and Drug Administration (FDA). Some dietary supplement makers claim their products work for weight loss,

but these products are also not reviewed by the FDA before they are marketed. “Under our existing laws, manufacturers have the responsibility for ensuring that their dietary supplement products are safe and effective,” says Christine Lewis Taylor, PhD., R.D., director of the FDA’s Office of Nutritional Products, Labeling, and Dietary Supplements. Many weight-loss products claim to be “natural” or “herbal” but this does not necessarily mean that they are safe. These ingredients may interact with drugs or may be dangerous for people with certain medical conditions. If you are unsure about a product’s claims or the safety of any weight-loss products, check with your doctor before using it.⁴²

The dietary supplement industry generates annual sales estimated at \$12 billion.⁵² Up to \$800 million of this was spent on “sports supplements” in 1998 alone.⁵¹ An important consequence of the 1994 Dietary Supplement Health and Education Act⁵³ reveals that many

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products, including several androgenic steroids like androstenedione and dehydroepiandrosterone, became widely available over-the-counter in the United States and through the Internet. Furthermore, this act enables companies to market their products as nutritional supplements, only if they do not claim to diagnose, prevent, or cure disease, thus avoiding a regulation by the FDA.

In recent years, many people have tried them to lose weight and increase muscle mass by methods other than proper exercise and healthy eating. The following section presents a list of some of the popular “fat burning” and “muscle building” supplements everyone can be purchased over the counter

Androstenedione (Andro)

According to the Dietary Supplement Health and Education Act, androstenedione is a dietary supplement⁵³. However, it is not part of a normal diet⁴⁸. The supplements may increase muscle mass and increase testosterone. Androstenedione is a prohormone and a direct precursor of the anabolic hormone testosterone. This conversion to testosterone is believed to accelerate increases in muscle size and strength, as well as enhance energy output. However, a study by the Journal of American Medical Association (JAMA) found that androstenedione supplementation did not increase testosterone concentrations in blood or enhance skeletal muscle response to resistance training in their 30 male subjects. Instead, observation revealed that androstenedione users showed decreases in their high-density lipoprotein (“good cholesterol”) concentrations and androstenedione users experienced increased estrone and estradiol concentrations⁴⁹. There is no study to determine the safety of this product. The possible risks of andro usage are heart disease, cancer, liver damage and stroke. Excess growth of body hair and

aggressive behavior are also side effects. Andro is banned by the NFL, NCAA and Olympics. In other word, the study found that andro didn't work and its use could cause adverse health effects^{49,50}.

Caffeine

The common claim of caffeine use is to increase fat usage and prevent bone loss. The risks of the products include anxiety, upset stomach, insomnia, dehydration and irritability. In 205 healthy postmenopausal women, caffeine consumption (three cups of coffee per day) was associated with bone loss in women with calcium intake of less than 800mg per day⁴⁹. According to Desk Reference to the Diagnostic Criteria from DSM-3-R (55), the LD₅₀ of caffeine (that is the lethal dosage reported to kill 50% of the population) is estimated at 10 grams for *oral* administration. Lethal dosage varies from individual to individual according to weight; however, ingestion of 150mg/kg of caffeine seems to be the LD₅₀ for all people. In cups of coffee, the LD₅₀ varies from 50 to 200 cups of coffee (1 cup of coffee contains about 200mg of caffeine).⁵⁵

Protein (amino acid) supplement

Many nutritional supplements purported to increase muscle mass are widely available at health food stores; however, many of these supplements have little or no data to support their claims. Protein supplements will not increase muscle mass, unlike their claims.⁵⁶ Although protein or amino acid is the main source of building muscle and bone, protein itself will not make the muscle. The average American diet provides more than enough protein to build muscle. Safe amounts of protein are 0.8 – 2.0g/kg body weight. Large amounts of protein may cause dehydration. Excess protein may be stored as fat.^{57,58}

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Arginine

Arginine is the key amino acid for the stressed patient and has been shown to have a wide range of important biologic effects, especially when provided as a dietary supplement.⁵⁹⁻⁶⁷ Arginine will help release glucagons and growth hormones. The effects of growth hormone (GH) have been studied previously in animal experiments that demonstrated an increase in muscle weight and size. The GH treatment can increase lean body mass and strength in a few months⁶⁸. Some studies show that under resting conditions, serum growth hormone concentrations are decreased in obesity. In non-obese individuals, acute exercise of sufficient intensity increase GH levels. However, conflicting data exists concerning the GH response to exercise in obese individuals.⁶⁹ Growth hormone secretion is impaired in response to all traditional pharmacological stimuli acting at the hypothalamus, such as insulin-inducing hypoglycemia, arginine, galanin, L-dopa, clonidine, acute glucocorticoid administration, and to direct somatotrope stimulation by exogenous growth hormone releasing hormone (GHRH).⁷⁰

Glutamine

It is one of the growth hormone releasing hormone-stimulating factors (GHRH) and is known to be the most abundant amino acid in the body, composing two-thirds of the amino acid pool. Under normal conditions, glutamine is a non-essential amino acid and requirements can be met by endogenous production. Glutamine has become more prominent as several studies revealed that it might contribute to protein synthesis, anti-proteolytic and growth hormone elevating effects.^{71,72} During exercise or times of metabolic stress, the demands for plasma

glutamine markedly increase. since various immune cells, such as lymphocytes and macrophages, depend on glutamine as a primary fuel source.⁷¹ Several clinical studies show that glutamine supplementation promotes reduction of protein catabolism and increase of protein synthesis.⁷⁴⁻⁷⁷ Due to its ability to increase protein synthesis, excess glutamine supplementation may promote nitrogen retention and prevent the loss of muscle protein.⁷³ Research has indicated that glutamine supplementation is safe for humans.⁷⁸ However, there is little data regarding long-term usage of glutamine supplements. Furthermore, additional research needs to be conducted to investigate the safety of glutamine supplements.

Conclusion

Body composition can be an effective yardstick to measure a person's health. Not only can it reveals unwanted fat deposit, but can alert one to connected health risks. Our goal of improving body composition can be accomplished by increasing lean body mass and reducing fat mass. Although adipose tissue is a critical part of our body, it can cause unnecessary fat. However, simply losing weight is not the sole solution toward healthy living. Many supplements are available over the counter promoting losing weight without an effort. Sadly there are no miracle pills approved by the FDA or proved by clinical researches for losing weight without harm. It is healthy eating and physical activity that should be promoted as the means to positive body composition.

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Overweight and Obesity

Dannie Allen

Attaining a socially acceptable body weight is important in contemporary society, but the growing statistics of those who are overweight or obese in the United States is now being considered less an issue of appearance than a health risk. In fact, the troubling rate of preponderance (excess of weight) and obesity now borders on a health crisis of epidemic proportions, as approximately 300,000 U.S. adults die of obesity related causes annually. Healthcare professionals researching the causes of obesity are trying to determine to what extent genes (nature) or lifestyles (nurture) determine a person's weight, and they are finding it is a fusion of many facets of an individual's life that can contribute to an unhealthy weight, including diet, experiences, genes, lifestyles, and emotional states. Although the success of weight management treatments depends on each individual, this article will present some of the various options available for achieving a healthier weight.

A Matter of Weight

There is a widespread, near-epidemic crisis in the United States. This crisis is a far greater calamity than violence, plummeting illiteracy rates, bloodshed, or drugs. The serious plight is overweight and obese individuals. Being overweight and obese is ranked among the most hard to manage health conditions in the United States, and their prevalence rates are on the rise.¹ Current studies indicate the occurrence of obesity has risen from 12% to 19.8% over the past decade, and currently over half of the adult population is categorized as obese.² In 2002, approximately 55% of United States adults were reported obese, and the Third National Health and Nutrition Examination Survey concluded that 33% of men were overweight.³ Women do not escape the weight crisis, either. A significant number of women in the United States fall into the category "obese". Many women might be startled by this because they probably consider themselves merely plump.⁴ The National Center for Health Statistics says that more than one-third of all American women are overweight.⁴ The market for women's plus sizes (sizes 16 and up) is a thriving \$22.7 billion a year.⁴

Heavy, fat, flabby, obese, chunky, stout, round, hefty, overweight...do these adjectives describe your physique? Do you fall under these startling statistics? Are you overweight? How do we define overweight? What is the measure of overweight?

The body mass index (BMI) is one of the most accurate ways to determine when a person's weight poses possible health risks. BMI is a measure that takes a person's weight and height to estimate total body fat. Scientific studies have used a wide range of BMIs (from below 27 to over 30) to define obesity. A more concrete spectrum of labels are BMIs of 25 to 29.9 for overweight, and a BMI of 30 or above to be considered obese.⁵ The optimal BMI is generally considered to be 21. The higher the BMI, the greater the risk an individual has of developing health problems.

A Brief History

So how did it all begin? Surely statistics weren't always this painful. Why is it that in this day and age we are seeing more overweight people and more obesity?

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All animal species have evolved in surroundings where population size was controlled mainly by the supply of food. In times of famine, species dwindled when many died of starvation and malnutrition. When food was in abundance, the population was able to thrive again. Organisms have physically devised ways to manage through times. When food was scarce, these ways of management are what ensured survival and made certain organisms in a population more adaptable to the environmental factors, which enabled them to reproduce. In such situations when the food supply was depleted, organisms that stocked nutrients in their bodies were the ones who had a better chance for survival and hence were the genetically superior. However, with time has come the advancements and improvements we now enjoy. With the dawn of technology, came mass food production and machines to do manual labor.

Throughout history there are accounts of individuals who were particularly fat, which was typically regarded as a sign of affluence and success. Being overweight or obese was rare

among the common masses because the general population did not have money, or resources, to fully feed themselves, or at least to overfeed themselves. Conversely, people with money and power could afford to indulge, making themselves more likely to be the people who were overweight and obese. In the last quarter of the twentieth century there has been a swift upsurge in those becoming overweight and obese regardless of wealth. Overweight or obese is no longer a rarity in our population. Instead, obesity abounds. When something is no longer rare, it inevitably loses its status. Therefore, people no longer view overweight or obese persons as ones who possess influence or success. Instead, now most individuals consider obesity both unsightly and hazardous.¹

Today, being overweight is a health issue. It appears as though the population has turned their backs (and eyes) from the overweight and obese population. Overweight and obese people generally fall prey to stigma.⁶ Stigma is understood to be a social creation that is influenced and driven by

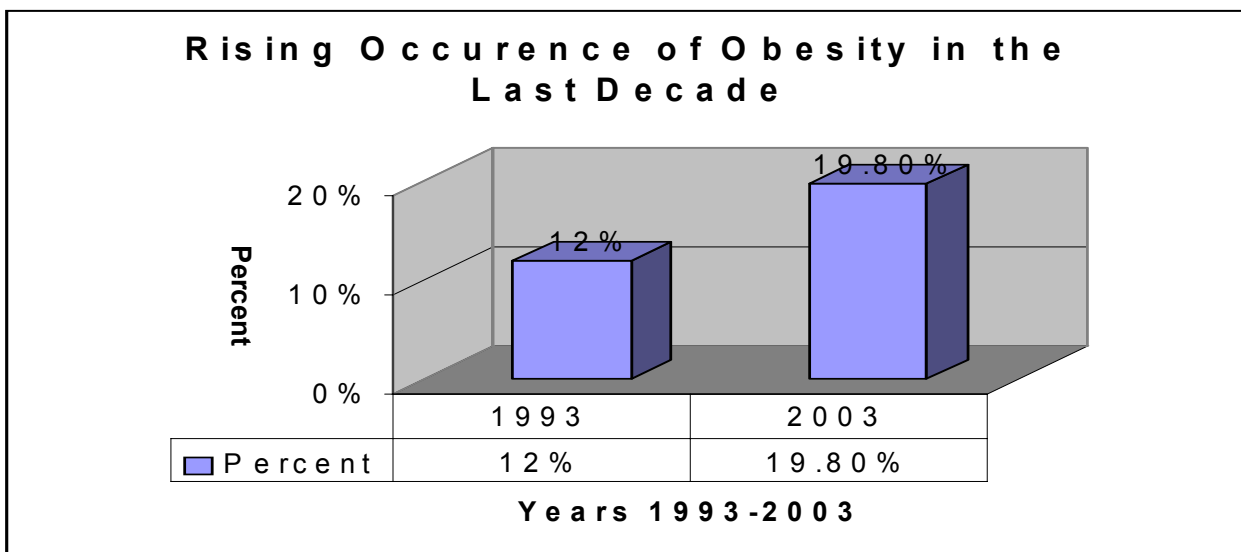


Table 1. Rate of rising occurrence obesity in the last decade.

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historical, cultural, and situational factors.⁶ A person who is stigmatized is seen by others to be different from expected norms because of undesirable characteristics.⁶ Overweight people are stereotyped as being lazy, greedy, slothful, and selfish, all of which are characteristics that ultimately lead to discrimination against them, often in employment situations.⁷

Even though not every study has linked inactivity to fatness, lifestyles that are sedentary have surely been implied as contributors to obesity.⁸ The increasing rate of preponderance (excess of weight) and obesity in developed countries (such as the United States) is defined by an average lifestyle based on an over-consumption of food in merger with a low amount of physical activity.⁹ This change in lifestyle is a product of such advances as automation and technology.⁹ The amount of people who walk to work or ride their bike has decreased because of automobiles, and there has been an increase in sedentary activity, such as watching television.⁹

Nature vs. Nurture

Due to the overwhelming weight dilemma in America, scientists, doctors and psychologists are searching for the causes of this health crisis. There appear to be many factors, from a person's gene pool to the behaviors in which an individual engages, stress, psychological issues, and the inadequacy to experience pleasure in the activities of one's life.

"Nature vs. Nurture" is a term that has emerged in an effort to shed light on the weight issue. It means examining overweight and obese individuals in terms of genes versus environment. "Nurture" aspects include childhoods, diets, eating habits, living conditions, and stress levels. Gaining weight can be due to family traits, or "nature" components, because obesity has a tendency to run

in families. The question is to what extent does "nature" determine weight, and how much responsibility do lifestyles (the nurture element) account for?

In the quest to search for new ways to treat preponderance and obesity, scientists are using molecular genetics, positional cloning, and testing genetically based obesities in rats and mice. Their hope is to unmask the means of obesity. Through technological advances in genetics, such as positional cloning, scientists have found a defect in obese mice.¹ In these mice, adipocytes are unable to secrete leptin. Adipocytes are connective tissue cells which specifically make and store fat. Leptin is a neurotransmitter involved in the regulation of appetite, thus making this defect an abnormality in obesity.¹ Because the mice have specific tissues that do not function properly, the tissues are unable to secrete the chemical, which regulates appetite, and mice are more prone to preponderance and obesity. The defects involved with leptin and the central nervous system receptors are the root of multiple genetic obesities in mice.¹

Even if an individual possesses a genetic make-up prone to obesity, there is still a probability this condition will never emerge. This is the nurture component of "Nature vs. Nurture". It is important to remember neither genetics nor lifestyle alone determine an individual's maximum weight. Rather, it is a fusion of many facets of an individual's life that can attribute to an unhealthy weight.

Emotional States and Weight

Emotional states have more of an effect on weight than people realize. Emotional situations and emotional states affect food intake.¹⁰ Researchers have discovered a trend in which underweight people tend to eat less when faced with negative or emotional situations, while

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overweight people eat more.¹⁰ The same is true for students who diet. Dieters eat more when depressed, and non-dieting persons eat less when depressed.¹¹

Several studies have been reviewed in regard to emotional eating and its relationship to body weight. In these studies, emotions dealt with have almost always been depression or fear.¹⁰ Stress seems to play a pivotal role as well. During periods in a school year when testing is prevalent, such as finals week exams, stress abounds, and overweight individuals tend to consume more food than others.¹⁰ Studies have shown obese individuals overeat in negative emotional states (such as states of depression and/or fear).¹⁰ The explanation for this eating behavior is overweight people overeat in order to alleviate emotional stress. The psychosomatic obesity theory suggests that for overweight individuals, eating reduces anxiety and discomfort.¹²

A number of investigations have tried to link specific weight issues in females with personality characteristics.⁸ These investigations are attempting to address the link between predispositions and overweightness.⁸ These studies revealed the likelihood that overweight and obesity are associated with such personality variables as stress, low self-esteem, and warped body images.⁸

A recent study presents the theory that overweight college students, who were particularly susceptible to stress-related overeating binge episodes, are involved in a limited amount of pleasurable activities.¹³ In this particular study, a key finding was overweight college students have less enjoyable and pleasant activities.¹³ By having positive activities to engage in, students can take their minds off of stress, work, or jobs. For a period of time, students can have stress and tension release, causing them to feel recharged and rejuvenated. Some individuals use exercise as a form of

tension relief, which is good for both physical health and emotional health.

Much attention is aimed toward weight in contemporary society.⁷ The mainstream of the attention is directed toward women.⁷ Because weight plays such a crucial role in the evaluation of a woman, females who are considered to be healthy and of appropriate weight are viewed in society as more attractive, better mate and partner choices, and they are viewed more positively in general.⁷ Overweight or obese women are considered flawed. Their weight is viewed as a handicap because society believes individuals have the ability to overcome overeating at will.⁷ These facts may actually encourage an overeating cycle by creating stress or pressure on an overweight person. Trying to attain a socially acceptable body weight may make a person feel the end result is unattainable.

The College Factor

The dreaded “Freshman 15” is a rumor that proposes in a person’s first year of college they will either lose or gain 15 pounds. Sadly for most, it seems they gain. First year college students deal with a whirlwind of emotions and circumstances. All these emotions can cause excess weight if not kept in control. College seems to be the perfect avenue for overeating and binge eating, which lead to unhealthy weight gain.

It is important to remember college students may make changes in eating patterns and behaviors. A student who leaves home and is at college in a different location will have to adjust to cafeteria food if he/she resides in on-campus housing. Likewise, another student will have to adjust to cooking for him/herself if residing in any other housing situation other than on-campus. Since community colleges are appealing with their reduced prices and convenience, there are many college students who remain at home while attend-

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ing school. Those that remain at home stay within their normal eating habits. They are more likely not to experience a “food adjusting” phase.

Similarly, not all students adjust to college life the same way. Obviously, starting college can be a wonderful experience. For some it can also be stressful, and every person handles stress and emotions differently. It seems logical for students who cannot cope with stress positively to turn to food as a comfort or consolation, thus resulting in overeating or obesity.

Many college students engage in drinking alcohol and participate in alcohol drinking games. Students drink alcohol for many reasons. Those reasons may include peer pressure or possibly the need to unwind and feel relaxed. Some students drink alcohol because it is the only way they know how to deal with their problems.

Over the past ten years, a large amount of research has accumulated regarding college students and their use and abuse of alcohol.¹⁴ Intense drinking behavior is defined as consuming four or more drinks for women, and five or more drinks for men in a single episode.¹⁵ Recent studies estimate that more than 40% of college students who engage in drinking alcohol are “binge drinkers”.¹⁶ In a random sample of full-time undergraduates, it was estimated that one in four college students who completed the questionnaire had drunken at a binge level three or more times in the two weeks before they were surveyed.¹⁴ Over-consumption of alcohol has the high possibility to interfere with a healthy lifestyle and a healthy weight.

It is important to remember moderation in drinking alcohol. Over-consuming alcohol could interfere with weight loss efforts. Reducing the amount that you drink, or drinking “light beer” are options for students who do not wish to give up drinking entirely, but would like to make some

modifications to their drinking in order to keep their weight at a healthy level. Ways to protect against binge drinking that could impair your quality of life are living in dormitories that are substance-free, and interacting with circles of peers who demonstrate self-control, trust, and self-respect.¹⁴

Convenience?

There are more than 12 million students currently enrolled in the 3,600 colleges and universities in the nation.¹⁵ One in four people, between 18 and 24, in the United States is currently a full-time or part-time student.¹⁷ From height and weight reports, 35% of college students are overweight or obese, and 46% of all students have reported trying to lose weight.¹⁷ The life of a college student is busy and hectic. Everyday, students have classes, labs, clubs, activities, studying, and some students work part or even full-time. A college student is typically on the run and more likely not to have extra cash flow for expensive foods. Therefore, vending machines with sodas and fast food become his or her daily diet.

Also, increases in portion size means excessive caloric intake.¹⁸ Portions offered by fast food chains are two to five times larger than the recommended size!¹⁸ There is no doubt, as a college student it is convenient to have food fast, cheap, and ready when you need it. However, eating such food frequently does not establish healthy eating habits that ensure longevity. Unfortunately, a large percentage of college students are putting their health at risk by choosing to eat unhealthy foods and to not participate in physical activity. Students must consider the question: Are all of these fast food places that are packed with oversized meal portions and high fat truly a convenience for the busy student lifestyle, or sabotage to health efforts? Perhaps both.

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Adverse Effects of Unhealthy Weight

Each year, approximately 300,000 adults in the United States die of obesity related causes.¹⁹ In the United States, overweight and obesity increase morbidity and impair quality of life.¹⁹ The rising statistics of overweight and obesity in the United States are bothersome and disturbing. These increases are troubling because overweight and obesity put individuals at risk for certain health issues, such as type 2 diabetes, coronary heart disease, hypertension, gallbladder disease, sleep apnea, and dyslipidemia.²⁰ A high-fat intake that has the potential to lead to obesity, also adds to the development of non-insulin-dependant diabetes mellitus (NIDDM, type 2).²¹ Being overweight puts a person at risk for gallbladder disease and some types of cancer.¹⁷ Excess body weight is associated directly with several organ cancers, such as colon, breast, endometrium, esophagus, and kidney.⁹ Having excess body fat causes such health problems as cardiovascular disease, and many other serious medical conditions.²² Avoiding weight gain is an important dynamic for the prevention of cancer.

Being overweight or obese may also adversely affect lung function.²³ Having an excess of weight may worsen asthma.²³ If weight loss is achieved, improvements have been shown in relation to airway collapse, stimulation of adrenal activity, and also reduction in possible allergens and bronchoconstrictors.²³

Deflating the Balloon

Now that we know about the history, causes, and adverse health risks associated with being overweight or obese, we need to examine what actions to take to repair the problem.

Weight control can be accomplished by making changes in one's energy intake, and by increasing physical activity. The American Heart Association encourages people to take a proven and safe route in order to reduce weight for good health, as opposed to falling prey to "fad" diets.²⁴ These diets are flawed because they require dramatic changes in food and eating patterns that are difficult to maintain and do not promote physical activity.

A key element in the battle against being overweight and obese is exercise.²⁵ Physical exercise and a healthy diet have been recommended in order to reverse the rising level of preponderance among adults in the United States.¹⁷ A further recommendation for long-term treatment, as well as prevention of obesity in adults, includes combining healthy diets, exercise, and certain modifications to lifestyle (such as quitting smoking and reducing alcoholic consumption).²⁶ Weight management interventions that focus on lifestyle are important for promoting changes in behaviors dealing with exercise and diet.

There are many benefits to exercise. In order to increase public knowledge of health problems due to inactivity, many health organizations and health professionals attempt to accentuate the profits of exercise. The importance of exercising in relationship to disease prevention and quality health has been recognized repeatedly in the last two decades as overweight and obesity levels have risen.²⁰ Exercise plays a crucial role in reaching and maintaining a healthy weight, but there are also many other benefits to regular exercise. Some additional benefits include improving overall psychological well-being, decreasing levels of anxiety and depression, decreasing pre-menstrual related symptoms, advancing mood levels, and self-esteem, and improving levels of body image.²⁰ It is recommended to engage in at least 30 minutes of some form of physical activity most days of the week.¹⁷ Developing cardiorespiratory fitness is key

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for prevention of certain ailments. Therefore, participating in vigorous physical activity for 20 minutes or longer, at least three days per week, is recommended. Physical activities that enhance and maintain muscular strength, endurance, and flexibility are also recommended.²⁷

Food consumption must be controlled in order to lose weight. The positive consequences of intaking minimal amounts of carbohydrate foods combined with exercise, is that an individual will begin to lose weight. The effects of a low-carbohydrate weight-loss diet are effective, and more effective than a *low-fat* diet.²⁸ National goals for healthy eating habits are increasing daily consumption of vegetables and fruits, and reducing the amount of fats consumed.²⁸ The positive effects of caloric restriction (CR) on longevity dramatically illustrate the power of diet to positively change health.²⁸ To date, neither gene, nor drug, nor intervention of environmental factors has been as successful in prolonging longevity as caloric restriction.²⁹ The best way to achieve and maintain a healthy weight is to balance the calories that you consume with the calories that you burn. In order to reduce excess body fat, it is important to restrict your calorie intake. A decreased intake can be accomplished by reducing portion size and being modest in consumption of foods that are dense in fat and refined sugars. Foods high in fat and calories should be replaced with healthy foods, such as beans, whole grain breads, and many fruits and vegetables.

The aging process is inevitable. It is common knowledge that as one ages, more energy and effort are required to stay in shape and healthy. High metabolisms are able to burn more calories, and lend the individual to a relatively higher food intake. Low metabolisms are not able to burn as many calories, so a person with a low metabolism should not have a high caloric intake. As a person ages, their metabolism slows, and therefore it is

important to keep exercising. To prevent future health problems as we age, we need to keep eating healthy foods, and equally as important, we need to keep exercising. The typical, sedentary, elderly person's lifestyle does not lend itself to much physical activity or exercise.³⁰ A profile regarding the expenditure of energy in laboratory rats in cages, essentially identical to that of a sedentary elderly person's living was conducted with the objective to determine if light exercise improved the inevitable age-related decline in energy.³⁰

Surgical Options for Treatment

In some cases of severe and morbid obesity, options for treatment, such as dieting or drug therapy, have not produced long-term effectiveness. In special cases, there is a surgical option for treatment. Bariatric surgery is one of those options. It is a type of surgery performed on the stomach or the intestine region. The surgery helps people who are extremely obese lose weight. It is an option that is available generally for people with a BMI that is 40 or above. One of the ways in which bariatric surgery works is to restrict a person's ability to eat, or by interfering with absorption of what is ingested.³¹ These types of surgeries can be performed from a laparoscopic standpoint, which is beneficial to the patient because this particular approach decreases patient morbidity.³¹ Procedures currently being rendered include gastric banding, biliopancreatic diversion, and distal gastric bypass. Vertical banded gastroplasty, which is a restrictive method, has fallen out of favor, as a result of not maintaining weight-loss long term.³¹ Non-surgical measures of treatment are always preferred in treating cases of obesity that are mild or moderate.

Supplements to Reduce Weight

Many health care practitioners and overweight individuals are opting for pharmaceuti-

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cals and nutraceuticals to treat obesity. For some people it is more desirable to turn to these supplements, as opposed to standard treatment options (such as increased physical activity and caloric restriction), because of the high possibility of the weight loss only being temporary. Embracing behavioral change is unlikely for most people, and individuals who develop exercise programs do not always follow through.

Diet supplements are not a substitute for exercise or healthy lifestyles, and need to be taken with caution when used for weight loss. Drugs used for weight loss are most often referred to as anorexiant. ³² Many anorexiant lose their effectiveness over time, which requires the user to consume a larger dosage that can be addictive and also dangerous. ³² No supplementary weight loss product addresses or deals with the underlying issues of overweightness and obesity, so unless a physician has been consulted, people should opt for the use of non-drug methods for reducing weight.

Stimulants like ephedrine, caffeine, and their herbal counterparts, such as ma huang and guarana, prove to be effective in assisting weight loss, but unfortunately their use is controversial because of their undesired side effects. ³³ Some of the undesirable side effects include tremors, insomnia, dry mouth, nervousness, palpitations, tachycardia, hypertension and mood altering effects. ³³

There are several over-the-counter compounds, such as hydroxycitric acid, which have produced some effects in relation to weight loss. Hydroxycitric acid (HCA) is found in *Garcinia cambogia*, which is a type of fruit. HCA is thought to be useful for weight loss. It can help an overweight person by lowering the conversion of carbohydrates into fat that is stored in the body. HCA accomplishes this by inhibiting a certain enzyme in the body. The correct dosage of HCA is unknown at the present time. Some dieters take 500

mg of HCA up to three times per day before meals; however, this amount is much lower than the amounts distributed in the animal research of HCA. Currently, HCA has not been associated with any adverse health effects.

Dietary fibers such as glucomannan are believed to induce weight and fat loss as a result of acting like a bulking agent. ³³ By acting like a bulking agent, there is an increase in satiety and a reduction in caloric intake. ³³ Chitosan is a different indigestible non-plant fiber that has the potential to aid in weight loss as a result of reducing fat absorption in the intestinal tract. ³³ The herbal compounds fenugreek and *G sylvestre* create body weight loss, as well as possibly fat loss by several processes. ³³ The supplement Fenugreek is an herb that is grown in India, northern parts of Africa, and also southern Europe. ³³ Fenugreek seeds have been found to be composed of amino acids and fibers that exhibit blood glucose lowering activity. ³³ The *G sylvestre* herbal leaf has retarded weight gain, and has led to a substantial amount of decreased fat digestibility. ³³

“In 1989, at Veterans Administration hospitals in Milwaukee and Chicago, a small group of men, aged 60 and over, began receiving injections three times a week that dramatically reversed some signs of aging. The injections increased their lean body (and presumably muscle) mass, reduced excess fat, and thickened skin. When the injections stopped, the men’s new strength ebbed and signs of aging returned. What the men were taking was recombinant human growth hormone (GH), a synthetic version of the hormone is produced in the pituitary gland that plays a critical part in normal childhood growth and development”³⁴

Aside from playing a role in growth and control, the pituitary gland plays a role in metabolism. This secreted pituitary gland hormone is crucial for development and maintenance of certain

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organs and tissues.³⁵ GH cannot be purchased over-the-counter anywhere. It is available by prescription only, and so physician consent is mandatory when opting for the use of hormones. Hormones are very strong chemicals produced by glands.³⁶ Whether hormones are produced internally from glands or taken as supplements, they enter the bloodstream and can produce far-reaching effects.³⁶

Until recently, many physicians regarded GH as having little to no biological relevance in adulthood, after linear growth has subsided.³⁷ However, it has long been recognized that hypopituitary adults have such symptoms as low mood and energy levels, and obesity.³⁷ Researchers recognize these are symptoms of GHD syndrome (which should then be identified).³⁷ Some studies revealed that adults with GHD are both physically as well as psychologically less healthy than their peers, and that benefits as a result of GH replacement are maintained.³⁷ GH treatment improves quality of life in the first six months. However, more than six months are needed for the positive psychological effects in order to improve mood.³⁸ People with the condition of GHD have less energy and are more fatigued. Therefore, it is important for them to exercise and eat healthy, until further intervention can be obtained.

Chromium, an essential mineral of the body, is found in different proteins and dairy products. Chromium is also one of the main ingredients in certain types of over-the-counter drugs and supplements associated with weight loss. Some of the weight loss products containing chromium are: Body Solution, Metabolife, and also Dexatrim Natural.³² Chromium appears to be safe when administered in dosages of 50-200 mcg daily, but it is important to know that chromium is a metal and has the potential to cause problems if taken in excess.³² One problem resulting from too much

consumption of chromium is possible kidney failure.³²

Taking Charge

If you find yourself making excuses about your weight on the bathroom scale or during your annual physical at the doctor's office, maybe it is time to re-evaluate. Are you as healthy as you could be? Are you overweight? If the honest answer is one you are having trouble accepting, you're not alone. More than half of the United States population is obese. When was the last time you checked your BMI? Has your physician recommended a weight goal for you to try to achieve? If you know you're overweight, evaluate the situation. Does genetics play a role in your weight? Are you an emotional eater? Do you have positive outlets for your stress? When you're stressed, do you turn to food? If you a college student, have you been eating mainly carbohydrate foods in the dining hall or frequenting the candy counter? Have you been having health problems due to your weight gain?

If you are searching for ways to reduce your weight, the best way is naturally, without prescriptions or unnatural interventions. Eat healthy, use the food pyramid as a guide for your food choices and serving amounts, and remember to try to keep your caloric intake minimal. Exercise is your best ally in trying to lose weight. Examine your lifestyle. Are you engaging in unhealthy habits that could be sabotaging your weight loss efforts? It is important to realize that each case of overweightness or obesity is case dependent. Each person is unique. People are a product of different backgrounds, genes, and lifestyles. Not every college student lives in the dorms. Not every college student engages in a physical activity he or she enjoys to alleviate stress. Each person has his or her own story. If after evaluating and attempting health

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changes and there is still no positive difference in weight gain or loss, consult a physician and discuss alternative option. Every person deserves to obtain and maintain his or her best body weight.

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Nutrition for Healthy Individuals

Noemi Orozco

Eating a balanced amount of different types of foods is essential for supplying the body with the right combination of nutrients to keep the body healthy. However, following every piece of nutritional advice is unrealistic because there is little consensus about what foods we should eat to maintain optimum physical health. In addition to dietary patterns, other considerations that may conflict with nutritional guidelines are unrealistic ideals of body image, poor exercise habits, and a reliance on dietary supplements. Because there are many differences in attitudes toward food, including the comparison of food groupings and the recommended quantities of food groups, the best dietary advice calls for balance. This article will incorporate the advice of nutritional guidelines from around the world to increase awareness for correcting poor eating habits, developing healthy nutritional patterns, and minimizing health risks, all of which should begin as early as childhood.

Introduction

There are many misconceptions about the health benefits of proper nutrition. That is not to say that a healthy diet is not beneficial, rather it is just that most people are uncertain about what to eat to stay healthy. We are told that we need to look thin, but not necessarily what we should be eating to take care of our health. In other words, in a world dominated by consumerism and media persuasion, most people are getting mixed messages about the relationship between ideal body image, balanced diets, and overall health.

Everyone knows that good nutrition is a critical component of physical health and an important part of our daily lives, but there seems to be little consensus between health gurus, fad diets, and media advertisements for recommendations about what to eat and how to maintain physical health.¹ What is true is that proper exercise and following a balanced diet promote health and a sense of well-being. There is also hope that a healthier adulthood can be prepared for by beginning proper exercise and diet habits during adolescence, if not during childhood.²

One of the best places to start would be to take nutritional advice from the Food Guide

Pyramid, developed by the U.S. Department of Agriculture, but there are nutritional guidelines from around the globe that should also be considered. This article will compare the recommended nutritional intake with the actual nutritional intake by Americans, along with the attitudes toward food in different countries. It will also discuss the ideals of unrealistic body images, harmful dietary patterns, exercise habits, dietary supplements, as well as highlight the importance of good nutrition and exercise. All of these factors have an impact on the eating habits and popular body images among people all over the world.

The History of Nutritional Recommendations in the United States

An influential part in the understanding of nutritional intake comes from the dietary guidelines presented to the American public by the government. For about 100 years, the U.S. government has developed official dietary advice for U.S. citizens. The law establishing the U.S. Department of Agriculture (USDA), first enacted in 1862, gives it the responsibility “to acquire and

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diffuse among the people of the United States useful information on human nutrition.”³ The U.S. food guides developed at the beginning of the 20th century (1999-2000) are very similar to those developed at the end of the century. The first food guide, developed and published by the USDA in 1916, divided foods into five food groups, and suggested that dietary fats should constitute about 30% of daily calories.³ The most recent food guide, published as the Food Guide Pyramid by the USDA in 1992, divided foods into six groups, and the 2000 Dietary Guidelines for Americans established dietary fats at about 30% of daily calories.³ By the 1960s, the USDA’s focus on “food guides” had blurred the distinctions between “nutrient-focused” policies and “food-based” guidance, even though the distinction is made clear in the laws governing the USDA.³ According to the American Journal of Medicine, the separate elements of national food policies would ideally be defined in the following way:

- Nutrition policy determines the macro- and micronutrients in food that are both essential for healthy living, and dietary guidelines highlight this nutritional policy.
- Food policy determines which foods should be consumed by humans to satisfy the requirements of the nutrition policy, and food guides express this food policy for public use.

These distinctions were not clarified until the end of the 1970s, when the U.S. Senate published the first Dietary Goals for the United States, and the USDA followed 3 years later. Four years later, not much changed in the segmentation of the U.S. Food Guide. The Food Guide Pyramid still has five food groups: vegetables, fruits, meat, dairy, and cereals. And places fats, oils, and sweets in a “nongroup” group. Also, the guide displays six

Pyramid “blocks” representing the five food groups.³

In the early 1980s, nutritional professionals created the Food Guide Pyramid that would be used as the “driving force” for the future decisions made over the Food Pyramid Guide.⁴ Some of the goals were:

- Focus on overall health, rather than suggest diets to prevent or treat specific diseases;
- Be based on the most recent, authoritative dietary standards, and food composition and consumption data;
- Address the total diet rather than a foundation diet targeting nutrient adequacy only; and
- Build on successful elements of the previous guides.⁴

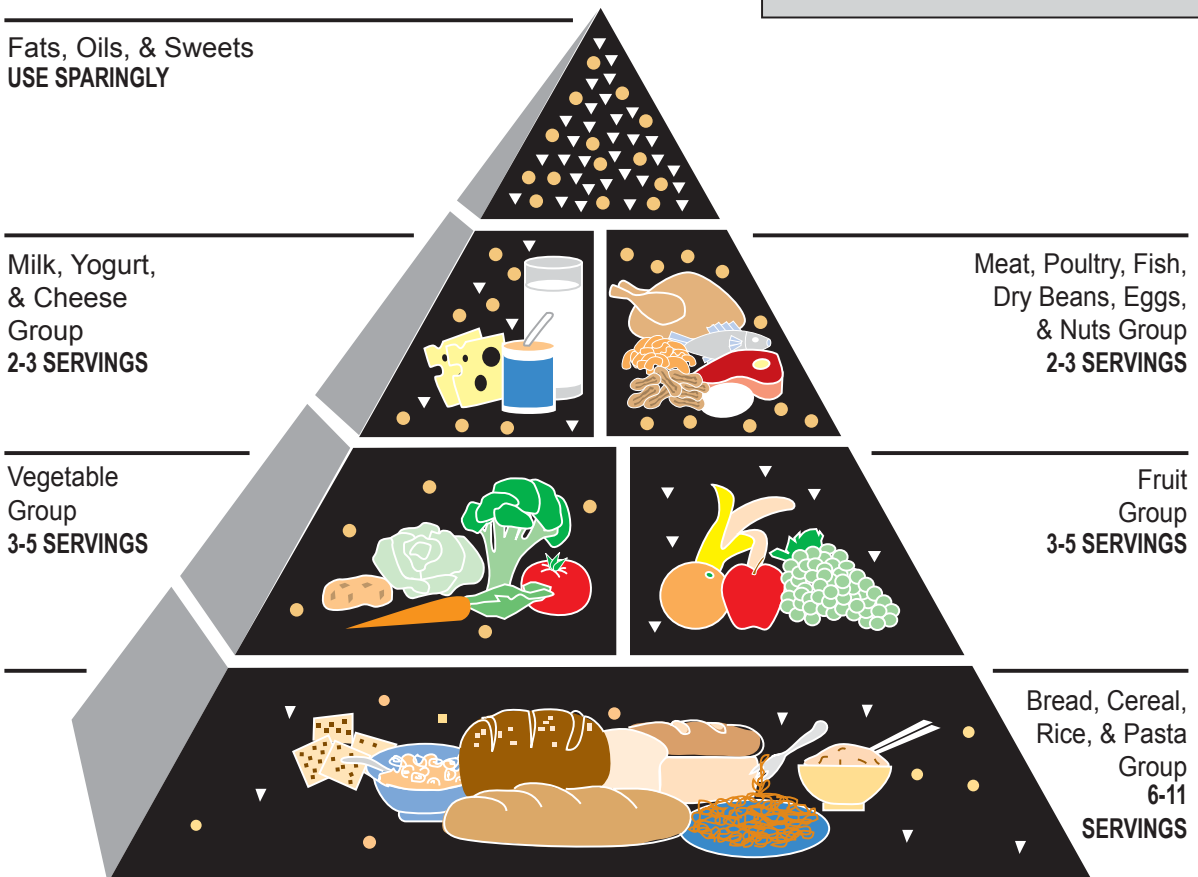
Due to the fact that the Pyramid is the main source of nutritional advice marketed toward U.S. consumers, it is also the bull’s-eye for praise and criticism. USDA officials think it is wonderful, while critics argue that although 58 percent of Americans say they have heard of the pyramid, only 13 percent say they understand it.³

A Guide to Daily Food Choices

KEY

- Fat (naturally occurring and added)
- ▼ Sugars (added)

These symbols show fat and added sugars in foods.



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Nutritional Patterns of Americans

Understanding the Food Guide Pyramid and following its advice or the recommendations of other nutritional guidance media is in the interest of every person. Yet Americans are either lacking education in nutrition or simply choose not to follow professional advice. A definite problem exists in the U.S., with statistics of unhealthy signs showing that health problems detected years ago have been growing steadily every year. The National Health and Nutrition Examination Survey conducted in 1999 reported that of the adolescents ranging from the ages of 12 to 19, the percentage of those who are overweight has increased.² From 1976 to 1980, 5% of adolescents were overweight, but these numbers increased to 11% from 1988 to 1994, and then increasing from that point to overweight prevalence among adolescents aged 12 to 17, with 22% of males and 21% of females being overweight.² In 1997, 62.3% of college students surveyed had eaten two or fewer servings of food high in fat content during the day preceding the survey. Female students (70.6%) were notably more likely than male students (55.5%) to report two or fewer servings of high fat content food.²

In a recent survey answered by American undergraduate students, 48% of overweight female participants acknowledged they were currently on a diet. And 21% of women with normal body mass indexes (BMIs) claimed to be on a diet. For the male participants, the overweight and the normal BMI students did not differ significantly when answering the question on whether they were on a diet, with answers totaling 26% and 20%, respectively.⁵ Even though the link between diet and health has been promoted to the American public in past years, food products have since changed their contents of fat, sugar, and energy. And these types of foods have invaded the marketplace. Studies show that “energy-dense,

nutrient-poor” foods continue to make up a substantial part of American diets.⁶

It is no surprise that college students are loyal consumers of these types of “energy-dense, nutrient-poor” foods. An advertising firm estimates that college students spend \$7 billion per year on “less essential purchases,” with this category including fast food.⁷ The same study noted that in a group of health magazines, fats, oils, and sweets made up 30% of the food advertisements. In contrast, advertisement for the fruit, grain, and vegetable groups was 6%.⁷ Therefore, the media displays food in ways that lead to obesity while promoting thinness. A high number of commercials aired during children’s programming promote foods with low nutritional value, including candy, soft drinks, sugared cereals, potato chips, and other high-salt, high-fat snacks.³ In fact, sweet snacks are consumed or referred to three to five times per half hour on prime time programming.

A study measuring nutrient intake among adolescents concluded that the foods consumed showed a lack of balance in their daily diets.⁸ Another recent analysis on the eating habits of adolescents reported that adolescents consume more than the recommended servings of fats, sweets, and meats, and less than recommended servings of breads and vegetables.⁹ In this same study, it was also shown that the participants that consumed higher amounts of “energy-dense, nutrient-poor” foods were less likely to eat foods from the five food groups.⁷ Although studies have shown that nutrition awareness and knowledge does increase with age, the answer to correcting the eating habits of Americans could be the re-education of the public on nutrition, and how to reduce the consumption of “energy-dense, nutrient-poor” foods.^{10, 7}

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Americans' Exercise Habits

A variety of different factors compel people to participate in regular physical activity. Some of these motivating factors include greater muscular strength, endurance, improved health, weight loss, emotional stability, appearance, and tension relief.¹¹ Considerable health benefits can be obtained by a moderate amount of physical activity on a regular basis.² Conversely, sedentary lifestyles are leading to health problems for Americans. "Reports have attributed 22%-30% of cardiovascular deaths, 20%-60% of cancer deaths, and 30% of diabetes deaths to sedentary lifestyles and dietary factors."¹² Watching television has been correlated with increasing the amount of snack food typically high in fat, sugar, and calories that children consume.¹³ The largest decline in physical activity takes place during adolescence, the age group of 15 to 18, and young adulthood, the age group of 20 to 25 into which most college students fit.¹⁴

Of individuals reaching the age of 21, only 30% of females and 42% of males dedicate time to vigorous physical activity routinely, and 50% begin an exercise program, abandoning it within 6 months.¹⁴ Ten percent of adults participate in regular vigorous physical activity, and 22% participate in regular moderate physical activity.¹⁴ For the most part, American adults lead sedentary lifestyles or are active only occasionally.¹⁴ National health-related surveys report that about two-thirds of high school students, 37.6% of college students, and 14% of adults take part in regular vigorous physical activity.¹⁴ The amount of time people actually participate in physical activity decreases over a person's lifetime. The most popular types of exercise for women were walking and aerobics.¹⁵ The most popular exercises practiced among men were walking and weight training.¹⁵ It is important to note that increased caloric and protein intake

might be necessary as a result of physiological and metabolic changes in the body when participating in physical activity.¹⁶

Unrealistic Goals: Current Ideal Body Images

Physical appearance is an important part of social life and self-esteem that begins in adolescence.¹⁷ The ideal of female beauty displayed in the media has become thinner over the past 30 years, and the difference between the ideal and the actual average body of young women has increased.¹³ While models used to weigh 8% less than the average woman, the difference is now 23%.¹³ Analyses of body measurements from 500 models listed on modeling agency web sites and from Playboy centerfolds from 1985 to 1997, indicated approximately 75% of those models had BMI of 17.5 or below, which is the American Psychological Association's criterion for anorexia nervosa.¹³ A comparable study suggested that the media now encourage an equally unattainable ideal image for men. Comparing the male centerfold models in *Playgirl* magazine from 1973 to 1997, the study found that with time, the male models have become notably more muscular.¹³

Many studies have reported that females are more likely than males to use the word "fat" when describing themselves, diet more often, weigh themselves more frequently, and seek medical advice for problems concerning excessive weight.¹⁸ Teen girls are most at risk for developing eating disorders as they struggle with a body image that is getting more and more popular in a culture that at the same time sells them junk food and tells them they should be thin. Bulimia is the answer for some girls. Chronic dieting and strenuous exercise, not for the purpose of health but for the purpose of having the ideal body, are the other possibilities the media present. Between 1970 and 1990 in the teen girl *Seventeen* magazine,

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although fitness articles did increase, the body shape of models has become more and more “linear,” and both nutrition and fitness articles emphasized weight loss as the primary reasons for dedicating time to the body.¹³

Even though estimates vary widely, it is suspected that 3% to 5% of the general population, and 4% to 22% of the college-age females, practice anorexic or bulimic behavior in an effort to be thin.¹³ These proportions have increased as media women have grown thinner over the past 30 years.¹³ In a recent national survey of 1,200 children, aged 10 to 17, 16% of girls and 12% of boys said they had dieted or exercised to look like a television character.¹³ These are complex illnesses that are unlikely to be caused only by observation of thin people in the media. However, it is reasonable to conclude that images of people shown in the media that are at the low end of the weight spectrum of society do in fact affect teens.¹³

Harmful Dietary Patterns

Poor eating habits and lack of exercise can place adolescents' health at risk. Data from the YRBS show that only 21.4% of students had eaten five or more servings of fruit or vegetables in the day preceding the survey, decreasing from 29.3% in 1997.² Male students (23.3%) are slightly more prone than female students (19.7%) to report this behavior.² The Second National Health and Nutrition Examination Survey reported that one-third of the total energy intake for the average adult was composed of food high in fats, oils, and sugars.⁶ A national telephone survey concluded that women were more likely than men to engage in potentially harmful and unhealthy weight control practices like using diet pills, vomiting, and using laxatives.¹⁵ In a large, statewide, population-based sample of a recent survey, it was reported that nearly one-third of males and over one-half of females indicated high proportions of disordered

eating.¹⁹ A study comparing college students in nutrition-related majors to students in majors non-related to nutrition, indicated that students with a formal education in nutrition did consume a diet that consisted of better food choices.²⁰

College Students' Intake of Dietary Supplements

Dietary supplements are an important part of the daily nutritional intake for many Americans. Studies suggest that approximately 23%-69% of the U.S. population consumes vitamin or mineral supplements.²¹ The Journal of the American Dietetic Association defines supplements as vitamins, minerals, herbal products, tissue extracts, proteins, amino acids, and other products consumed and bought to improve health and avoid disease.²² Dietary supplements are available in many forms, including liquids, gel tabs, powders, capsules, and tablets, which are available through the mail, convenience stores, pharmacies, and grocery stores. As dietary supplements get more and more popular throughout the United States, many manufacturers have also joined the diet supplement market, offering consumers a wide selection from which to choose.

Even though there is a wide array of supplements, American consumers have their favorites. Ohio State University participated in a survey of 784 students through which it was reported that multivitamins were the most commonly taken dietary supplement, with vitamin C holding the second most popular spot, and calcium being the third most frequently used.²² Another recent study examined the attitudes, knowledge, and usage patterns among 86 basketball players that participated in the NCAA Division M Pennsylvania Athletic Conference.²³ The supplements that were most frequently used were sports drinks (84%), vitamin C (56%),

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multivitamins (45%), power bars (41%), caffeine (38%), and ginseng (35%).²³ The reasons most frequently given for using the supplements were sports performance (58%), muscle development (58%), and tiredness/fatigue (26%).²⁴

It is important to be educated about what supplements are used to nourish the body. A survey was recently conducted to determine college students' beliefs regarding the safety and effectiveness of dietary supplements and the frequency of supplement use.²⁴ The survey was taken by a group of students in an introductory nutrition course in a mid-Atlantic university.²⁴ A majority 68% of students agreed supplements do not facilitate weight loss, and the weakest consensus was the belief that supplements are required by law to be proven safe for consumer use.²⁴ Up to 40% of the students reported using supplements at least one time per week.²⁴

A study was also conducted with the goal of examining the relationship between knowledge and vitamin and mineral supplement use among adult consumers²¹. Among the sample, 81.9% reported regular supplement use, with the multiple vitamin and mineral being the supplement most commonly used.²¹ Vitamin C was the most common individual supplement used, vitamin E second, and calcium third.²¹ The most common reasons for the use of vitamin and mineral supplements were meeting daily requirements, improving overall health, and well-being.²¹ There were no links found between vitamin and mineral supplement use and knowledge about the supplements.²¹

Although so many Americans consume dietary supplements, complete knowledge of what exactly the dietary supplement is or what benefits or health risks might come out of its consumption might not be very clear to most people. A study on the knowledge of dietary supplement label

information was conducted on female users.²⁵ The participants were given a test on the dietary sources of nutrients and answered 70% of the questions correctly.²⁵ Participants had misconceptions of the term "natural" on supplement labels, product claims, and testing for product safety.²⁵ To be better informed on information regarding dietary supplements, a database is offered by the interagency partnership between two federal government agencies: The International Bibliographic Information on Dietary Supplements and the IBIDS Database.²⁶ IBIDS was created to assist anyone in finding credible, scientific literature on dietary supplements.²⁶ The IBIDS website is located at: <http://dietary-supplements.info.nih.gov/databases/ibids.html>.²⁶ The Food Guide Pyramid recommends the following vitamins and minerals; vitamin A, thiamin, riboflavin, niacin, vitamin B6, vitamin B12, ascorbic acid, folate, vitamin E, calcium, iron, magnesium, phosphorus, zinc, and copper.⁴

The Attitude Toward Food in Different Countries

"While a wide range of reasons for food selection exists among varied populations, the human food selection process remains a complex and not entirely understood phenomenon."²⁷ The choices that people make about nutritional intake are linked to the ideas that have been presented to us through the media, people around us, and the way in which our caregivers fed us growing up. A recent survey compared college students from the United States, France, and India, and their free associations to food.¹⁰ The study concluded that out of the three groups, American students expressed the highest amount of concern toward fat consumption.¹⁰ Another survey, including college students and adults, was conducted to collect information on attitudes toward food from a sample of people in the U.S., Flemish Belgium, France,

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and Japan. The survey included questions on links between diet and health, concern about food, changes in diet to improve health, “the importance of food as a positive force in life,” the association of food as nutritional or “culinary,” and the satisfaction of diet.² Out of the four groups participating in this study, Americans were the group that associated health to food the most and food to pleasure the least. The French associated food to pleasure the most and food to health the least.² French and Belgians, either female or male, leaned towards the extreme spectrum of pleasure. Americans leaned toward the extreme spectrum of health, and the Japanese in between. Although Americans put the most effort to change their diets to better their health, they tend to classify themselves as the least healthy eaters.²

Two studies were conducted to see if whether “self-focusing” situations had an effect on whether people avoided fatty food. Mirrors were placed in front of half of the participants while tasting their choice of non-fat, reduced-fat, and full-fat foods.²⁸

The other half of the participants were offered the same foods but without the mirrors.²⁸ In one study, the food was cream cheese bagellets, and in the other study, the food was margarine spread on bread.²⁸ In both studies, participants ate more in the groups that were not placed in front of mirrors.²⁸ The consumption of the reduced-fat and non-fat foods was not altered by the mirrors, according to the study, “...perhaps because people thought these products were not unhealthy.”²⁸ The results support a “self-awareness theory” and recommend that participants of weight reduction programs could benefit from making food choices in self-awareness situations.²⁸

A high number of Americans believe that fat consumption shows through one’s health, and they believe fat intake to be negative at even very small levels.² The American standpoint toward

food differs from that of the French point of view in which food is seen as part of pleasure and enjoyment.² This difference in attitudes toward food contrasts with intake of the two groups. The French have a relatively high-fat diet; only 4% of the French participants consumed a diet that followed U.S. dietary recommendations for percent of calories from saturated fats.²

Health Recommendations from around the Globe

Not all diets are created equal. For example, the traditional Asian diet has been shown to be significantly lower in fat than the Hispanic diet.²⁹ In the U.S., the Food Guide Pyramid has become a more frequently used educational tool in recent years.³⁰ Many different food guides have been developed by governmental agencies around the globe. And the number of countries developing their own food guideline pictorial representations has been increasing over the last few years.³¹ They come in all different colors and shapes, and offer different advice. The way in which food groups are divided and the sizes of portions also vary country to country. However, much of the nutritional recommendations are very much alike. A recent study published by the Journal of the American Dietetic Association compared the national food guides of different countries. These countries included Australia, Canada, China, Germany, Korea, Mexico, the Philippines, Portugal, Puerto Rico, Sweden, the UK, and the U.S.³¹ The study focused on the comparison of food groupings and the recommended quantities for food groups.³¹

Serving Sizes Recommended From Different Food Guides

	USDA/HHS Food Guide Pyramid (6)	Canada's Food Guide to Healthy Eating (15)	Australian Food Guide to Healthy Eating (16)	The Balance of Good Health of UK (17)	Chinese Food Guide Pagoda (13)	Korean Food Guide Pagoda (3)	German Nutrition Circle
Grain	6-11 servings a serving; 1 slice of bread 1 ounce of cereal 1/2 cup of cooked rice or pasta	5-12 servings a serving; 1 slice of bread 30g cereal 1/2 cup of cooked rice or pasta	3-11 samples a sample; 2 slices of bread 1 1/3 cup of cereal 1 cup of cooked rice or pasta	More than 5 portions a portion; 30g bread 30g cereal 60g rice (not specific if cooked or dry)	300-500g (based on Raw weight)	4-5 servings a serving; 3 slices (100g) of bread 90g cereal 210g cooked rice	250-350 g of Bread/ day or 200-250g of cooked rice/ day or 250g-300g of Potatoes/ day
Vegetable	3-5 servings a serving; 1 cup of raw leafy vegetable 1/2 cup of other vegetables (cooked or raw) 1/2 cup of vegetable juice		2-9 samples a sample; 1 cup of salad vegetables 1/2 cup(75g) of cooked vegetable		400-500g (based on raw weight)		200g (cooked) & 100g (raw) & 75g of salad / day 100g (raw) legumes / month
Fruit	2-4 servings a serving; a medium apple, banana, or orange 1/2 cup of cooked or canned fruit 3/4 cup of fruit juice		1-5 samples a sample; 1 medium apple, banana, or orange 1/2 cup of fruit juice		100-200g		250-300g/ day; Minimum two portions fresh fruits
Vegetable & Fruit		5-10 servings a serving; 1 medium vegetable or fruit 1/2 cup of fresh or canned vegetable or fruit 1/2cup of juice		More than 5 portions a portion; 100-150g fruit		6-7 servings a serving; 70g raw vegetable 100g fruit 1/2 cup of juice	
Milk	2-3 servings a serving; 1 cup of milk 1-1/2 ounces of cheese	2-4 servings; a serving; 1 cup of milk 2 slices(50g) of cheese	2-5 samples a sample; 1 cup(250ml) of milk 2 slices (40g) of cheese	2-3 portions a portions; 190 ml milk 30g cheese	100ml milk & Bean 100g	1 serving a serving; 1 cup of milk 2 slices (40g) of cheese	1/4 liter of low fat milk or 90g of low fat Cheese/ day
Meat	2-3 servings a serving; 2-3 ounces of cooked meat, poultry, or fish 1/2 cup of cooked dry beans 1 egg	2-3 servings a serving; 50-100g meat (not specific if raw of cooked) 1-2 eggs	1/2- 2 samples a sample; 65-100g cooked meat 1/2cup of cooked dry beans 2 small eggs	2-3 portions a portion; 60- 85g meat (not specific if raw or cooked)	50-100g raw meat &50g fish & 25-50g Eggs	4-5 servings a serving; 60g of raw meat 1(50g) egg	150-300g of fish/ week or 300-600g of Meat/ week or 3 eggs/ week
Fat & Sugar	Limited	N/A'	N/A'	0-3 portions a portion; 30g cake	25g fats and oils	Limited	Less than 40g /day
Fluid	N/A'	N/A'	N/A'	N/A'	N/A'	N/A'	More than 1 1/2 Liter/ day

Source: Journal of the American Dietetic Association

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The categorization of food groups was similar throughout the different food intake guidelines.³¹ Small differences were found in the milk and dairy product group, the vegetable and fruit group, and the fat and sugar group.³¹ In Mexico, the milk and dairy product group was placed in the same group with other foods of animal origin, and the Philippines placed milk into their protein group.³¹ Fruits and vegetables were placed in the same group for Mexico, Portugal, Korea, China, the UK, and Canada, as opposed to the rest of the guidelines that separated it into two different categories.³¹ Certain foods might vary from section to section because they are difficult to classify. For example, a certain corn product might be placed in a certain category that best allocates the type of corn used.³² Sweet corn is classified as a vegetable, while popcorn and corn tortillas are classified as a grain.³²

The main recommendations for individuals were consumption of substantial amounts of grains, fruits, and vegetables, along with moderate intake of meat, milk, and dairy products.³¹ The U.S. food pyramid is the guideline that recommends the highest amount of meat intake. One study on consumption of super-sized meals from fast food restaurants by the American consumer found that one serving sometimes can consist of more meat than a person should be eating in the span of one or sometimes two days.³³ These results correlate with a study conducted on mood and carbohydrate cravings, which was defined as “the urge to seek out and consume particular foods,” and the food groups found to be the most craved were proteins and carbohydrates.³⁴

Studies have shown that diets low in meat product consumption are linked to health benefits. Approximately 2.5% of Americans follow vegetarian diets.³⁵ In a study comparing nonvegetarians to vegetarians, the nonvegetarians were more likely to meet healthier eating standards

and expand their life expectancy.³⁶ A middle ground between a vegetarian diet and a meat lover diet is the mediterranean diet.

The Mediterranean diet originally came from the seven country study initiated by Ancel Keys in the 1950s.³⁷ Coming from a region in which the food is delicious and also healthy, it is good news that the Mediterranean diet also comes from a region in which the average adult life expectancy is high.³⁸ The Mediterranean diet is also linked to low levels of chronic diseases associated to diet.³⁹ Health problems that have been linked to diet are obesity, heart disease, cancer, and osteoporosis.⁴⁰ As a result of cooperation between two institutions, the Mediterranean Diet Pyramid was released both by the Harvard School of Public Health and Oldways in 1994.³⁹ Oldways is a nonprofit company that developed the Asian, Latin American and Mediterranean Food Pyramid with the goal of displaying diets of cultures that epidemiological studies have linked to being healthy.⁴¹

The Basic Dietary and Exercise Guidelines in the U.S.



According to the American Dietetic Association, “all foods can fit into a healthful eating style.”⁴² Dietary recommendations for Americans include eating the balanced diet that is illustrated in the Food Guide Pyramid.⁴⁰ Physical activity guidelines recommend a minimum of 30 minutes of physical activity most days of the week, and a minimum of 20 minutes, three times a week of vigorous cardiovascular exercise.¹⁵ Regular exercise that increases muscular strength, endurance, and flexibility is also recommended.¹⁵

Diet recommendations presented to the American public include reduced intake of “energy-dense, nutrient-poor” foods that make up

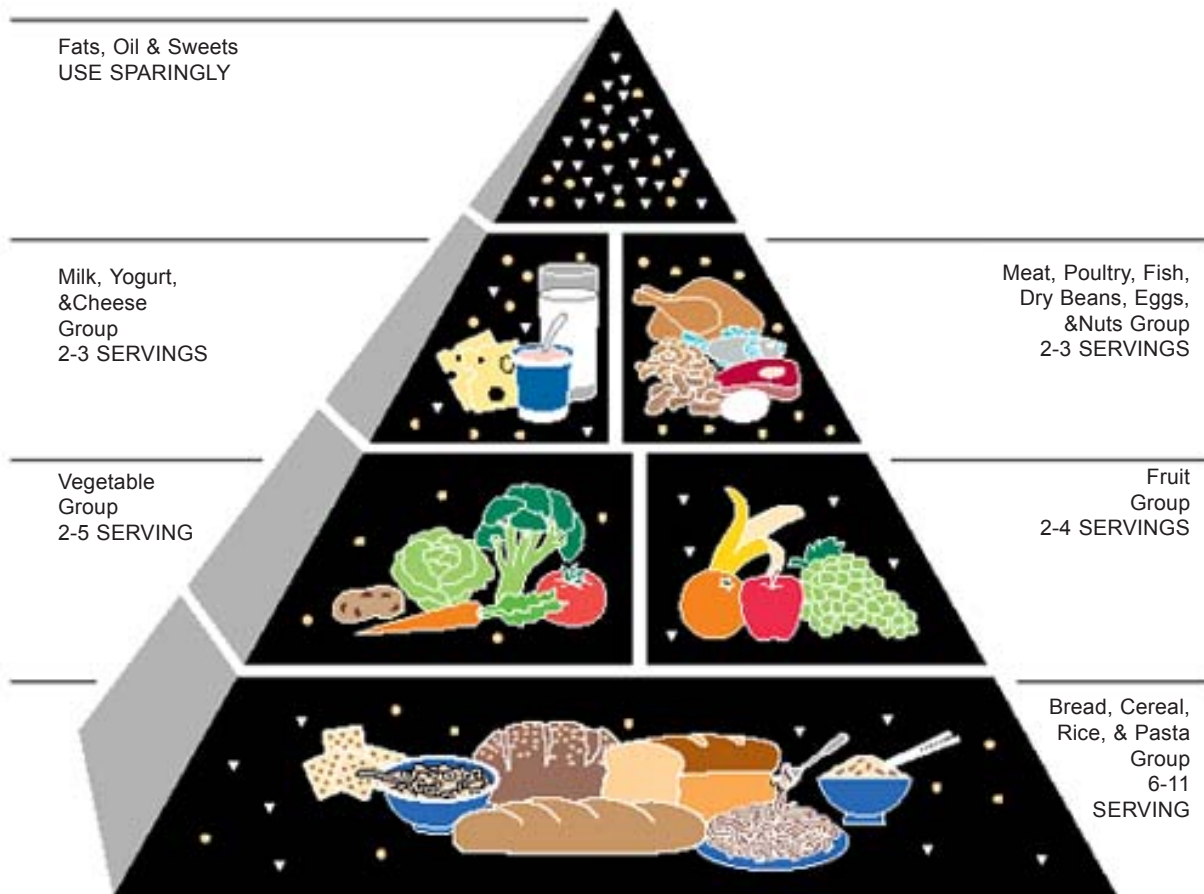
The Food Guide Pyramid

A Guide to Daily Food Choice

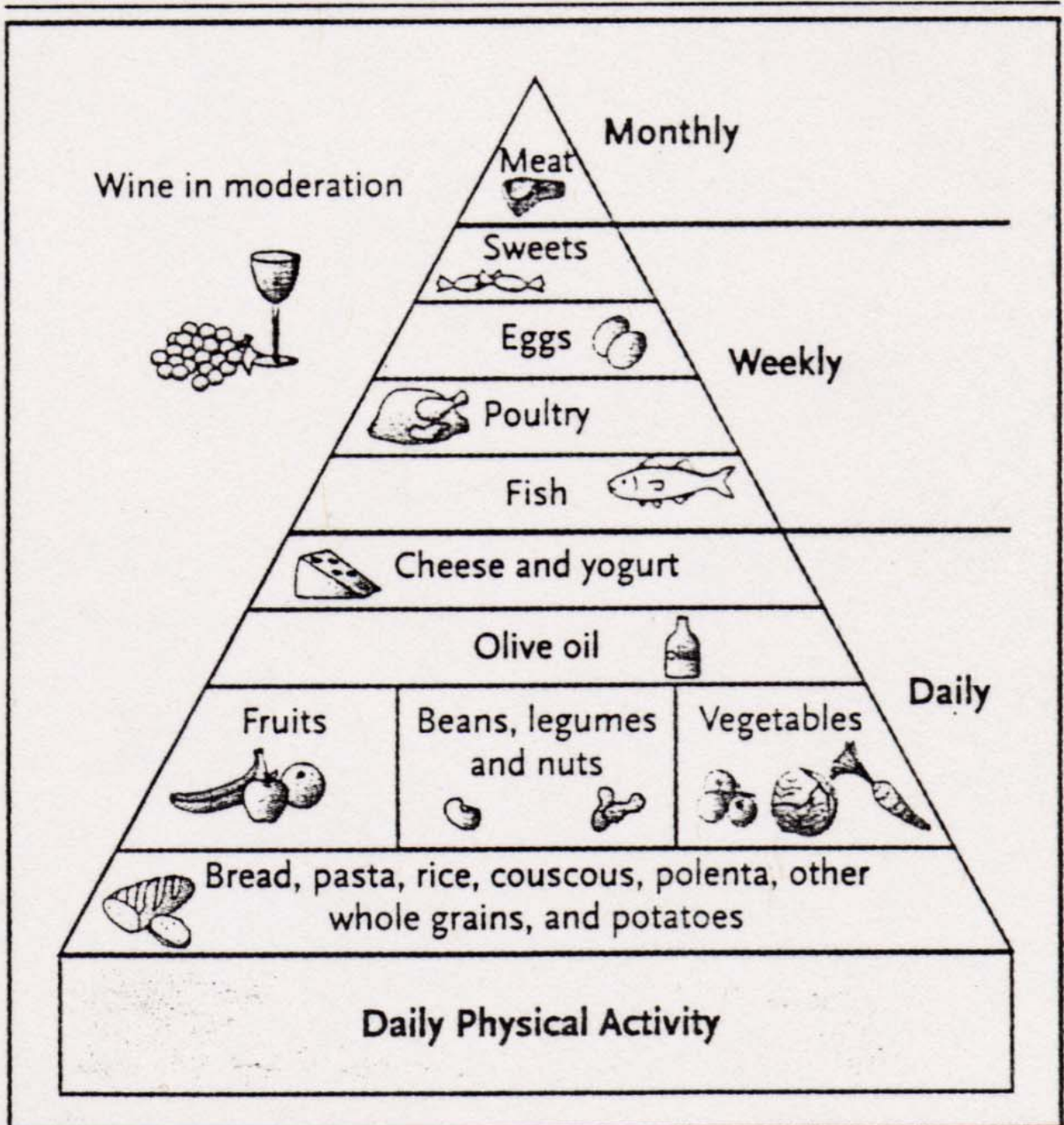
KEY

-  Fat (naturally occurring and added)
-  Sugars (added)

These symbols show fat and added sugars in foods



Source: U.S. Department of Agriculture



Food Pyramid Reflecting the Traditional Healthy Mediterranean Diet.

Adapted, with permission, from Oldways Preservation and Exchange Trust.

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the triangle at the top of the Food Guide Pyramid containing fats, oils, and sugars.⁶ Caution has been suggested by a recent study that reported that although the Food Guide Pyramid is an adequate guideline to follow, not giving special attention to choices in selecting foods from each food group can lead to a diet high in fat, sugar, and calories.⁴³ To promote nutrition education in presenting sensible food choices, dietetics professionals develop programs that include theories and models related to human behavior.⁴² Public policies that support the complete diet program are: Reference Dietary Intakes, Healthy People 2010, Nutrition Labeling, Dietary Guidelines for Americans, and the Food Guide Pyramid.⁴²

Following every piece of nutritional advice presented to the public is unrealistic. However, there is way of following a healthy nutritional pattern and it varies from individual to individual. Incorporating the nutritional advice from the different pyramids that adjusts to what makes the body feel good and conforms to our daily routine is key. For example, if a person prefers to eat less meat, certain vegetables can be consumed to supply equal amounts of protein needed by the body for optimal physical health. The element that is given in almost any dietary advice is balance. Eating a balanced amount of different types of foods is an integral part to supplying the body with the right combination of nutrients for keeping the body healthy. This balance can be maintained by paying attention to what we eat and taking the time to think about what types of foods we should eat. Many people in the United States feel that following a balanced and nutritious diet might take too much time out of their daily, busy schedules. However, by just remembering to eat a piece of fruit instead of a bag of chips could make a drastic difference in our future health.

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Confronting Eating Disorders: Compulsive Behavior and Weight Control

Heidi Burkey

Eating disorders are often a result of a complex web of biological, psychological, and cultural factors. The most common forms of eating disorders are anorexia nervosa (AN), bulimia nervosa (BN), and binge eating disorder (BED). These eating disorders can begin in adolescence, last a lifetime, or be fatal. Eating disorders affect both males and females, as well as people of all cultures, classes, and ethnicities. Because there are many common features and distinctions between the three major types of eating disorders, this article will discuss some of the causative factors, characteristics, diagnostic criteria, risk factors, treatment, and effects of each form. There will also be some discussion about the use of dietary and herbal supplements in treating eating disorders, as well as possible prevention methods.

Caloric intake is a requirement to sustain life and nurture good health among all living things on this planet. However, humans have for a variety of reasons developed complex issues with the food they consume, often resulting in eating disorders, or disturbances in eating habits that can result in physical and mental health impairment.¹

Denying the body sustenance, or fasting, may be part of a spiritual or political quest. There is a complex web of biological, psychological, and cultural factors that can lead others down the path toward eating disorders, often resulting in mental and physical illness. Perhaps the distinction is most graphically illustrated when people fast themselves close to death, in countries where there is neither drought nor lack of food, for the sake of appearance.

Eating disorders are typically classified into three diagnostic categories: anorexia nervosa (AN), bulimia nervosa (BN), and binge eating disorder (BED). Each of these disorders has commonalities and also specific features. Patients commonly digress from one into another and back again. Treatment of eating disorders is difficult and sometimes impossible with some patients. The onset of eating disorders usually begins in adolescence and is either resolved or continues on into adulthood, sometimes lasting a lifetime. A complex relationship between sociocultural pressures, family dysfunction, and psychological

issues seem to weave themselves into the development and continuance of eating disorders.²

Who gets an eating disorder?

Myths abound regarding who will be at risk for acquiring an eating disorder. Eating disorders affect both males and females, as well as people of all cultures, classes and ethnicities. Ethnic/racial differences, economic status, and even gender have been scrutinized by the general public as possible reasons for why someone will have eating psychopathologies. Research has proven that males are not immune from acquiring eating disorders.³ Lower economic status persons are not any less likely to have weight-related issues and behaviors than their higher economic status counterparts. Money, sex, and race are not components in these disorders.

Research among adolescents from diverse backgrounds has been conducted and shown that eating disorders are not just a Caucasian issue. Dieting and other weight control behaviors are more common among Native Americans, Asian-American, and Hispanic female teens, according to the Project EAT study.⁴ A healthy body image is more prevalent among African-American girls overall, while Caucasian, Hispanic, Asian-American, and Native Americans report more weight-related issues. According to the 1987 Minnesota Adolescent Health Survey and the 1998

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Minnesota Student Survey, data suggest that Asian-American boys were more likely to report dieting and binge eating than were Caucasian boys.⁵ Ethnic cultural values do not guard against the “broader socialcultural influences,” which generate the body dissatisfaction problems that ultimately lead to eating disorders.⁶

Causes of Eating Disorders

Influence of media, culture, participation in certain athletic sports, and physiology are some of the causative factors for development of eating disorders. These reasons will vary for the individual and sometimes the totality of issues in a person’s life will be more influential.

In both male and female dominated sports, athletes are pressured to maintain a particular body weight, size, and shape, which makes participation in certain sports a risk factor for eating disorders.³ Wrestling and boxing require that the contestant fit into a certain weight category prior to any match, which sometimes demands extraordinary dieting and purging of excess liquids from the body. Gymnasts and ballerinas have also been athletes that fit into the eating disorder pathology due to the stress of maintaining a lean, muscular, and low body weight. Young athletes in the latter sports find that when they reach puberty, and their body begins the dramatic changes into adulthood, weight and dieting become extremely important to continue competing. Many are denied a career in dance or gymnastics because they have grown into their adult bodies and this body type no longer fits the desired criteria.³

The pressures of media and culture on an adolescent may clearly have an adverse psychological impact; however, this cannot be the sole reason for one to develop AN, or any other eating disorder. The Hollywood beauty is rarely the average body type and over the last 30 years this

ideal has become increasingly thinner. According to “Never too thin: Why women are at war with their bodies,” models used to weigh about 8% less than the average woman and now they weigh about 23% less. Even male models have changed over time, with their bodies becoming increasingly muscular.⁷ The desire to have the unattainable body is an ever-present image in most people’s minds, especially during adolescence, when the focus on appearance is at its most critical stage. At this point in life, we set our eating patterns and also our values of self-worth. Being dissatisfied with our bodies and beginning to diet at an early age to achieve the magazine body are elements of the eating disorder pathogenesis.

An increase in television watching begets inactivity and thus decreases health-promoting activities, such as exercise and healthy nutrition. Television commercials are dominated with advertisements for candy bars, fast food chains, sugar-laden cereals, sodas, and potato chips. Watching these ads over time increases our desire to eat such unhealthy foods, promoting the opposite body type of the one we desire. Confusion over the types of foods promoted and the ideal body type is intense for adolescents and adults, whether it is conscious or not. This combination of poor nutrition and inactivity only further degrade the ability for adolescents to become comfortable in their bodies.⁷

In looking for a physiological cause of eating disorders, research has associated abnormalities in hormones, such as serotonin and leptin, with both AN and BN patients. Serotonin is a neurotransmitter that signals to the body while eating when it is full or satiated. A decrease in serotonin levels can lead to depression and an increase may lead to the reduction of food intake.⁸ Leptin is a hormone released by fat cells, which regulates food intake and energy metabolism.^{9,10} Levels of leptin in patients with AN, BN and

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obesity have been reported to be abnormal.⁹ AN patients that have been studied by the Beth Israel Deaconess Medical Center and Harvard Medical School showed decreased levels of leptin prior to weight gain and recovery.¹⁰ Biological disturbances in hormones and neurotransmitters have not been singled out as the sole causal factor for the development of an eating disorder; environmental and psychological factors also play major roles.

Based on the literature reviewed, research in the United States and in other countries has indicated that there are multiple factors that contribute to the risks associated with developing an eating disorder. Past histories, including family dysfunction, sexual assault, certain compulsive or impulsive behavior characteristics are a few of the shared traits among those clinically diagnosed. Each eating disorder has various possible pathogenesises and for every patient these factors may be different; however, certain similarities have been well documented. Dominant characteristics, diagnostic criteria, risk factors, and treatment methods for each of the major eating disorders are discussed in greater detail below.

Anorexia Nervosa **Characteristics**

With AN there is a persistent and determined pursuit of weight loss, and to the patient this loss is not seen as a problem, but rather an achievement. The typical AN patient perceives himself or herself as overweight, and has an intense fear of gaining weight.¹¹ Approximately 0.5% of the female population in Western countries is affected by this disorder.^{12,13} Age of onset is typically in the mid-adolescent years, between 15-19 years old.¹⁴ Patients with AN have mortality rates six times higher than their peers without anorexia.¹¹ Most deaths will occur due to either medical complications or suicide.

Anorexics usually show symptoms of depression, anxiety, lack of sexual appetite, complete sexual avoidance, impaired concentration, obsessive behavior, and irritability.¹ “Cutting,” or self-mutilation, is another feature sometimes seen in AN patients. Development of AN varies for each individual. Research suggests that the common causative factors are family history of AN; obesity; eating and weight problems; substance abuse; obsessive-compulsive disorder; a history of exposure to traumatic events; and the presence of specific characteristics, such as perfectionism, obsessive compulsive behavior, compliance, and low self-esteem.¹⁵ Individuals recovering or in treatment for AN report both external influences, such as family environment, and personal factors like dieting and stress in the development of their eating disorder.¹⁶

There are two subtypes of anorexia: the restricting type and binge-purging type.¹¹ In order to achieve the low weight goals set by an anorexic, various methods are employed. The following examples are only a few of the documented techniques and not all patients with AN will adhere to these: severe and selective food restriction, self-induced vomiting/purging, abuse of laxatives, enemas, diuretics, diet pills, and excessive exercising.¹ As more weight is lost, these techniques will usually increase because AN patients perceive the weight loss as an achievement and become determined to lose more pounds. Along with this disease comes a natural withdrawal from friends and family to hide their disorder so as not to be confronted.

Diagnostic Criteria

According to the Harvard Mental Health Letter from February of 2003, approximately one in 200 persons in the United States will develop AN at some point in their lives. A high percentage of these people will be female, about 90%.¹⁷ The general diagnostic criteria include:

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1. Weight loss – must weigh less than 85% of the normal weight for age and height;
2. Intense fear of gaining weight;
3. Body image is severely distorted;
4. Amenorrhoea or loss of menstruation.¹⁸

Risk Factors

Twin studies have been conducted to establish any genetic correlation in family units. Results from a clinical study, utilizing twins in France as their subjects, indicated that 55% of monozygotic twins and 7% of dizygotic twins have AN concordance. Other studies have been conducted to verify this information and various percentages of concordance have been reported, thereby confirming that eating disorders can have a genetic predisposition.¹⁹

Although no typical family exists who will cause AN to develop in their children, some specific traits are common. A higher percentage of patients with AN have parents who are divorced, separated or widowed.¹² Parents, especially mothers, who are intrusive, very strict, overprotective, and very controlling are frequently observed.²⁰ Based on a study of families with children who have eating disorders, parents of anorexics “communicated a double message of nurturant affection combined with neglect of their daughter’s needs to express themselves and their feelings.”²¹

The diagram below is a representation of the movement between eating disorders that are typical for diagnosed patients. Christopher Fairburn and Paul Harrison presented this model in 2003 to explain the vacillation between eating disorders. The arrows vary in size: the larger the arrow the more likely the movement into the other disorder. Arrows pointing out of the circle indicate recovery.¹

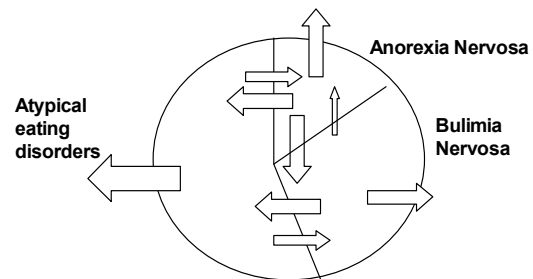


Figure 1: Movement between eating disorders.

Pro-Ana, or pro-anorexia, web sites abound on the Internet. These sites vary in nature but are generally places for the individual to show their artwork, “thinspiration” pictures, poetry, and prose. Great attention has been given to these web sites recently because those with eating disorders can find a place where other people relate to their disorder. Live journals are ongoing communications for registered users to discuss their eating disorder, depression, self-mutilation, or just share art and poetry. Because the users provide each other with support and ideas for weight loss, destructive behaviors and a multitude of other self-immolation issues, the public has become very angry regarding this venue for discussion. The general public has responded with protest to these sites and many have already ceased operation. Eating disorder pride has become a method for some anorexics to cope with their disease. In other words, many anorexics consider AN a lifestyle choice, not a disease.²⁰

Treatment

Anorexics are the most difficult patients to treat due to the specific psychopathology of the disorder. There is little shame in their behavior and an AN will feel achievement in the loss of weight.

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Treatment may be what is forced on them by friends and family, not what is chosen by them. Many patients will continue their restrictive food intake throughout their lives, even if they have been through treatment and are supposedly “cured.” For 10-20% of individuals with AN, this disease will be unrelenting and incurable. Therapy and treatment may take up to 5 years to be successful.¹

Treatment will begin with the refeeding of the patient or normalization of healthy body weight. Secondly, psychological therapy is necessary to treat the preoccupation with food and fear of gaining weight. If other psychiatric disorders are present in the individual, certain pharmaceuticals may be used. Fluoxetine (Prozac) is used for the depressed client and for obsessive-compulsive disorder. Prozac seems to be most effective after the weight has been normalized.²² Inpatient and outpatient treatment facilities handle the refeeding of the client and closely monitor food intake and exercise, as well as provide medications and numerous therapy sessions. New methods of treatment include using virtual reality-based, experiential, cognitive therapy.²³ Italian research has shown that this technique of integrating the cognitive behavioral therapy and virtual reality computer systems is beneficial in treating patients with eating disorders. Results of a study reported in 1999 show that by immersing the client into a synthetic environment programmed specifically for the individual, the therapist conducting the session can motivate the client to change and enable the client to see themselves as they really are.²² Dealing with real world issues and decisions that the client will have to make are also vital for using the virtual reality system along with therapy. Cognitive behavior therapy is the restructuring of how a person thinks about his/her life. The patient is then taught problem solving and methods to control behavior. Homework is often assigned so that the client will think about personal progress on a daily basis and be involved with recovery rather than

avoiding his/her inner self until the next appointment. By increasing the amount of time the patient spends on personal progress, the more effective the treatment.¹⁸

Adverse Effects

Even if a patient is successfully treated for AN, serious, long-term medical complications can occur. There is a loss of bone density due to the lack of calcium intake, reduced estrogen secretion, and increased levels of cortisol.⁸ Weight gain and regular menstruation improves the patient’s outcome; however, later in life osteoporosis may be a serious problem. Estrogen therapy can assist with prevention of osteoporosis.⁸ Suicide is the number one leading cause of death for anorexics and cardiac arrhythmias are the second.¹⁴

Bulimia Nervosa

Characteristics

In 1990, research indicated that approximately 1% of adolescent and young women have bulimia nervosa.^{24,25} This disorder seems to be most prevalent among Western, Caucasian females, ages 19 to 24, and increasing among young adolescents and males.²⁴ In an Australian study conducted with 93 male college students, 3% reported self-induced vomiting and 2% reported that they had BN. Although this sample size is very small, it is an indication that young men do exhibit eating disorder characteristics and health professionals should be aware of this increasing issue.²⁶

According to the American Psychiatric Association, about 1-4% of women aged 15-30 years old suffer from BN. This disorder tends to develop later in life, usually between 18 and 20 years old, unlike AN.²⁷ It usually begins with the restrictive diet, similar to AN, but progresses to

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episodes of binge eating. A sense of loss of control during these periods of bingeing makes the person feel shame and the fear of gaining weight is intense, which leads to purging or other methods to rid the body of the calories consumed. When binges become more frequent, and the person's body weight approaches near normal levels, purging or other methods of "weight loss" also become more frequent. Typically, the BN activities intermingle with the AN criteria.¹ Frequently, these two types of patients will vacillate between the two disorders.

Negative family life and trauma in childhood are more likely to be causative factors in the development of BN.²⁸ This disorder commonly has comorbidities, such as drug and alcohol abuse, depression, anxiety, and post-traumatic stress disorder.^{1,29,30} Shame regarding the binge-purge behavior is often an element of the disorder, making it more likely that a BN will seek assistance with recovery.

There are two subtypes of BN: either the purging type or the non-purging type. A non-purging bulimic will use fasting or excessive exercise to not gain weight from the binge. A purging BN will include vomiting, or use laxatives, diuretics or enemas.¹¹ Each person who fulfills the diagnostic criteria of this disorder will vary in how they rid themselves of their binge calories. Neither a body mass index (BMI) nor a measure of weight is used as criteria for the bulimic because, characteristically, they do not tend to be low weight due the vacillation of under eating and overeating.

Amounts of food consumed in one binge session may be over 1,000 calories.^{1,31} However, it may not necessarily be that the individual has eaten excessive amounts of food, rather it may depend on what types of food were consumed. If something eaten is outside of the normal dietary choices, for example a "forbidden food," it may constitute a

binge. Losing control of the intake of food may be justification enough for purging, or utilizing one of the techniques to rid the body of the calories.³¹

Diagnostic Criteria

The main diagnostic criteria for BN are:

1. Over-evaluation of weight (e.g., places extreme importance on body shape and size).
2. Recurrent binge eating – episodes of uncontrolled overeating (more than once a week for at least 3 months).¹¹
3. Strict weight control behavior (e.g., restrictive dietary control, frequent self-induced vomiting, laxative and enema abuse).^{1,24,32}
4. Does not meet criteria for AN.

Risk Factors

Many of the risk factors for the development of AN are similar to BN, including family dysfunction and pressure by parents or siblings to lose weight (teasing or taunting). Additional BN risk characteristics include trauma during childhood or in adolescence (usually sexual violence), and specific personality traits (e.g., passive-aggressive, immature defense mechanisms, anger, and impulsive behavior).^{24,30,33,34} Three psychiatric disorders are commonly diagnosed in BN patients: depression, anxiety, and substance abuse.³⁰

Family dysfunction is a major cause of BN and can include a variety of negative behaviors occurring in the home. Based on studies with patients who have been diagnosed with BN, maternal intrusiveness and under-involvement have been identified as factors for the onset and continuation of the disorder.³⁵ Higher degrees of conflict, anger, and negative communication methods within the family dynamic have also been observed and reported.^{35,36} Mothers with boundary

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control issues, that invade personal space and privacy, behave competitively with their children, and exhibit overly aggressive interest in their adolescent's weight, body shape or food intake can be causative agents in the eating disorder pathogenesis.³⁵ Research on the effect of the father's behavior has been limited in research, but based on Rorty's study reported in 2000, fathers of bulimics were more often behaving in a sexual or seductive manner with their daughters.³⁵ Jealousy on the mother's part may be aroused when fathers are acting in a sexual manner with their daughters, thus creating the competitive environment. A paucity of research exists regarding the paternal involvement with eating disorder pathogenesis and future studies would be a boon to this field.

Some studies are indicating eating pathologies may be related to sexual abuse. According to a study conducted by North Dakota State University and reported in 2001, dating violence and unwanted sexual contact increased the likelihood that girls would report weight control measures by 6% to 13%.³⁷ A national household probability sample study of 3,006 women indicated that women with BN were more likely to have survived rape, sexual molestation, aggravated assault, direct victimization, and have a lifetime diagnosis of post-traumatic stress disorder.³⁴ Additionally, the act of purging and not bingeing may be the integral piece that is related to a past history of sexual assault.³⁴ Another study in 1996 indicated that one in four of the binge eating and purging cases in the United States were correlated to childhood sexual abuse.³⁸

A multitude of research has shown that the BN patient has a greater possibility of having been the survivor of a sexual assault. Loss of control or the perception of having no control in one's life is the possible outcome of a traumatic event, including sexual abuse or assault.³⁹ This belief is also known as an *external locus of control*, and the

higher the perceived loss of control in your life, the greater your locus of control.³⁹ Impulse control problems are also a correlated problem for diagnosed BNs. The inability to resist the urge to do something that is dangerous or harmful to oneself, and an increase of excitement or tension before and enjoyment during the act, is the definition of impulse control disorder.⁴⁰ Kleptomania, suicidality, self-mutilation, trichotillomania (hair pulling), substance abuse, high numbers of sexual partners, and bullying of others are listed as possible impulse control behaviors associated with BN.^{24,41}

Treatment

Patients generally seek treatment after about 5 years of having this disorder and may have depression and anxiety disorders.¹ Patients diagnosed with strictly BN are more likely to seek treatment due to the probability of having other psychological comorbidities. The guilt or shame that is associated with purging can also increase the likelihood of help-seeking behavior. Studies suggest that the best treatment for BN patients is cognitive behavior therapy, lasting about 4 to 6 months. Antidepressants may be beneficial in reducing binge frequency but there is evidence that many patients will relapse once the medication is discontinued. An estimated 33% to 50% of patients continue their behavior even after therapy and antidepressant medications.⁸ Therefore, therapy should be directed toward body image and underlying factors causing the eating disorder.



Figure 2: Teeth of a bulimic

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Adverse Effects

Possible complications of BN include the degradation of the enamel on the teeth, gum infections, ulceration of the esophagus, infection of the salivary glands, electrolyte imbalance, and loss of potassium. Arrhythmias and sudden death may be the consequence of disturbing the potassium and electrolyte balance due to vomiting and loss of fluids.⁴²

Binge Eating Disorder **Characteristics**

This eating disorder was only recently categorized and defined by the American Psychological Association (APA) in the *Diagnostic and Statistical Manual of Mental Disorders*. BN and BED have the similar characteristic of bingeing; however, with BED purging behavior is not exhibited.⁴³ Obese patients with BED have a higher degree of clinical depression and exhibit anger and impulsivity traits.⁴⁴ The APA suggests that 1-4% of the female U.S. population endures with BED.²⁴ BED seems to affect all races and ethnicities similarly.⁴⁵

Both men and women are susceptible to BED, and studies of individuals who sought treatment for obesity reported that 23% to 46% had binge eating characteristics.⁴⁶ BED is diagnosed evenly among both males and females, unlike AN or BN, which have a higher female occurrence.⁴⁶ According to a study of BED patients reported in 1997, men reported more psychiatric disorders and substance use than women. Also, the results indicated that women reported binge eating when emotionally upset but the men did not identify a correlation between the episode of binge eating and negative emotions.⁴⁷

Patients with BED seem to take more eating pleasure from their binges than do BNs and feel less negative emotions after the binge.⁴⁸ Characteristics of the BED patient may include

“low self-assertiveness, high levels of self-directed hostility, and a difficulty in expressing anger.”⁴⁴

Diagnostic Criteria

Diagnostic criteria for BED include:

1. “Recurrent episodes of binge eating
2. Binge eating episodes are associated with at least three of the following:
 - a. Eating much more rapidly than normal
 - b. Eating until feeling uncomfortably full
 - c. Eating large amounts of food when not feeling physically hungry
 - d. Eating alone because embarrassed by how much one is eating
 - e. Feeling disgusted with oneself, depressed, by how much one is eating
3. Marked distress regarding binge eating
4. The binge eating occurs, on average, at least 2 days per week for 6 months
5. The binge eating is not associated with the regular use of compensatory behaviors (e.g., purging, fasting, or excessive exercise) and does not occur exclusively during the course of AN or BN.”⁴⁵

Risk Factors

Risk factors for binge eaters are parental depression; susceptibility to obesity; other people commenting about shape, weight, and eating; negative childhood experiences; and psychological disorders.^{8,49} Individuals with BED have reported that their families were not unified, there was a great deal of conflict, parents did not encourage the expression of feelings, and the family was very sedentary. Additionally, parents did not put much emphasis on the “...pursuit of political, social, intellectual and cultural activities or participation in social or recreational activities.”⁴⁹

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Twin modeling studies conducted by the Virginia Institute for Psychiatric and Behavioral Genetics indicated that there is “substantial heritability of obesity, moderate heritability of binge eating and a modest genetic correlation between the two traits.”⁴⁶ Comorbid mental disorders with BED and BN patients are similar (e.g., depression, anxiety, and substance use) and may be related to the binge-eating characteristic.^{29,43} Episodes of depression seem to concur with binge eating, which indicates the cyclical struggle of weight control, eating, and mood disorder.⁵⁰

Treatment

Patients diagnosed with BED are usually obese and most present themselves for treatment around age 40; however, onset of the disorder may begin in early adolescence.^{1,50} The rates of this disorder vary drastically based on the literature reviewed, with variations ranging between 2% to 47% of obese patients seeking treatment.⁴⁵

Cognitive behavioral therapy is a common type of treatment provided for approximately 20 weeks, at least once a week. The therapy should focus on the reasons for the eating disorder and associated thoughts and attitudes about body shape and weight. Numbers of binges may be decreased with this method of treatment, ranging between 48% to 98%.^{41,45} Interpersonal therapy is a more effective form of treatment for BED patients, with results of research showing 71% reduction in binge eating episodes and after one year, maintenance had been sustained.^{41,45} Weight loss, however, was not observed in the patients who had undergone the therapy treatments.^{45,51} Virtual reality-based therapy can also be used for the treatment of BED with results of a study by Riva et al., indicating improvement of the psychological state of the patient, body image satisfaction, and motivation for change.⁵²

Antidepressants prescribed to BED patients have not shown permanent reductions in binge eating episodes. Most tend to return to binge eating cycles once they discontinue using the drugs. Weight-reduction programs that do not address BED seem to be a favorable method of treatment because they provide a regimen of strict meal plans, which may provide the individual with more control over caloric intake. Not only is the client reducing the amount of bingeing but also losing weight, which was not a factor in any of the psychotherapy treatment options. Depression seems to affect a large portion of persons with BED, approximately 59%, and avoidance of these issues could be highly problematic. Therapy directed at the depression and not the eating disorder, combined with a weight-reduction program, might be more beneficial for long-term results.⁴⁵

Adverse Effects

The adverse effects of BED are few, unless the patient is overweight or obese. Type II diabetes, high blood pressure, coronary heart disease, sleep apnea, osteoarthritis, stroke, and certain cancers are some of the most common diseases identified with being overweight.⁵³ Medical complications such as these are very serious and life threatening.

Supplements and Eating Disorders

Deficiencies of vitamins and minerals in the body cause a variety of chemical imbalances, which in turn propel the cyclical nature of eating disorders. The use of supplements in one's diet can provide the missing nutritional requirements to assist with recovery. Herbal remedies may also be helpful in the process.

Adolescence is a critical period for bone mineral deposition because the bones must reach their peak of development at this time. If the body

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does not get the necessary minerals, there is a higher risk for developing osteoporosis. Calcium supplements may be important in protecting the bones from further loss, especially if taken with vitamin D.⁵⁴ Zinc supplementation used during recovery and treatment of anorexics can increase weight gain and improve levels of anxiety and depression, according to a study conducted in Vancouver, Canada.⁵⁵ In addition, since zinc assists with healing of infections, it could be used for bulimics who are recovering from periodontal and esophageal infections. The most common dosage level is 25 milligrams (mg) daily. As little as 2 mg and up to 50 mg are the dosage ranges. High doses of zinc can cause a copper deficiency. Doses as high as 150 mg/day can cause diarrhea, dizziness, drowsiness, vomiting, loss of muscle coordination, and lethargy. Zinc can also reduce the effectiveness of certain antibiotics such as quinolones (e.g., ciprofloxacin, norfloxacin, ofloxacin, and levofloxacin) and tetracycline antibiotics.^{56,57}

Patients suffering from eating disorders may find relief from some of their symptoms, such as depression, anxiety, and insomnia, with the careful selection and usage of high-quality herbal supplements. The herbal supplements discussed below are only a few that may ease some of the symptoms associated with eating disorders. A person not yet diagnosed, or someone who is beginning to show symptoms of eating disorders, may also benefit from the use of these herbs.

One of the most popular herbs taken by persons suffering from depression is St. John's Wort. This herb has been used for more than 2,000 years and is now the second leading herbal supplement sold in the United States. The flower of St. John's Wort is extracted and effectively used as an antidepressant for mild to moderate depression symptoms. This herb is also known as hypericum. Some patients may benefit from the properties of this herb; however, there are several side effects,

including mild gastrointestinal symptoms, dizziness, confusion, sedation, and dry mouth. Another possible negative effect of taking St. John's Wort is drug interaction with certain pharmaceuticals, such as digoxin, cyclosporin, indinavir, warfarin, estrogen, and theophylline. When taken alone, there is reportedly fewer side effects than pharmaceutically produced antidepressants.⁵⁸⁻⁶⁰ Depression is a serious condition that should not be disregarded. If you, a friend or a loved one is depressed, consultation with a physician is critical to recovery. Relying on herbal supplements is not recommended for clinically depressed patients.

Ginseng can provide energy and relieve stress for patients suffering from eating disorders. There are three varieties of ginseng used as supplements throughout the world: Asian, Chinese or Korean (*Panax ginseng*); American ginseng (*Panax quinquefolius*); and Siberian or Russian ginseng (*Panax notoginseng*). Studies have indicated that patients reporting stress and fatigue showed significant improvement after taking ginseng and up to 4 months after discontinuation of the ginseng. Side effects are usually noted when consuming ginseng with pharmaceutical products; however, the number of patients with documented cases are small. When the ginseng intake is discontinued, the negative side effects ceased.^{59,61,62} Some of the side effects are insomnia, nervousness, and long-term use can cause menstrual complications and breast tenderness in women. Pregnant and lactating women should not use ginseng. Typically, the recommended dosage of Asian ginseng is 1 to 2 grams of raw herb or 200 mg daily of an extract, which contains 4-7% ginseng. Taking ginseng for up to 2 to 3 weeks is suggested, followed by a one-to two-week rest period without consuming any ginseng.⁶²

Passionflower is also suggested as a sedative for patients who exhibit mild anxiety

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symptoms. Negative reactions have not been reported in human subjects and no toxicity among rat subjects has been reported. Another herbal supplement that may relieve some of the anxiety associated with eating disorders is Skullcap. It is recommended for relief of spasms, convulsions, delirium tremens, and anxiety disorders. This herb is usually prepared in combination with valerian and/or passionflower. There are no known side effects; however, an overdose can cause giddiness, stupor, confusion, seizures, and possible liver toxicity.⁵⁹

These herbal supplements and others are available at a variety of health food stores. Follow all directions on the containers' labels and research each herb for further information about side effects and possible drug interactions. Discussing the use of supplements with your doctor is recommended if you are taking other medications. Purchase only high-quality herbal supplements to eliminate possible contaminated or weak supplements. A high-quality supplement may not be easy to identify with so many available on the market. The expensive supplements may not be the marker for high quality. Research any supplement you are interested in taking with reliable resources and consult with a professional. The local health food store clerk is not a clinically trained professional and should not be relied upon for medical advice. Certain herbal supplements can cause serious health effects and even death.

Prevention of Eating Disorders

Since treatment options have not always proven to cure the patient with an eating disorder it seems logical that a public health model of prevention could be a possible method to stem the increase in eating disorders. There is a paucity of prevention research and results of studies have been mostly negative for long-term behavioral change.

Generally, the method of teaching adolescents about eating disorders has included informational instruction sessions with warnings about the dangers and health effects. Rarely does this type of prevention prove to be efficacious.⁶³ Adolescents who are prone to eating disorders will continue their behavior even if they know the possible outcome. Body image and self-esteem building workshops were reportedly more effective techniques. An eight-topic curriculum, developed for girls age 12 to 14 years old, called "Full of Ourselves: Advancing Girl Power, Health and Leadership" has a very activity-oriented approach. Three unique components to the curriculum were "...1) a strong feminist, sociopolitical perspective; 2) an emphasis on translating knowledge and awareness into personal and public action; and 3) a mentoring component." This prevention model has been tested on thousands of adolescents in the U.S. in five separate research studies. Although the knowledge base was shown to improve among subjects, the behavior modification did not occur. Dieting behavior still continued at follow up. Using a prevention model that includes booster sessions, which creates a stronger correlation between behavior and knowledge, may show more positive results. Additionally, the importance of integrating the activism component into their real lives, including their parents and friends, should be emphasized.⁶⁴ Another recommendation for preventing eating disorders is to have doctors screen all of their adolescent patients as part of the physical examination process. An early intervention may prevent the possible onslaught of the disorder.⁶³

Conclusion

Based on research of the literature, treatment of eating disorders is not fully successful for all patients. Some have found relief from their suffering, but others might be hospitalized multiple times before they can change or die. Patients with

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AN generally have the most difficult time being treated and recovering to a regular mode of food intake due to the very nature of the disorder. Most patients with eating disorders find themselves vacillating between AN and BN, with symptoms lasting throughout their lives, sometimes with periods of wellness, but falling back into old patterns when life changes become too difficult. A person's full recovery from eating disorders may take years but the prognosis for success will depend on the patient's readiness and ability to change.

Eating disorders have become more prevalent in Western society, which may be due to better diagnosis and reporting of diseases. Possible reasons for the increase in numbers may not only be due to reporting but to the quantities of food that are available to our industrialized nations. Perhaps if food were not so plentiful, individuals would not identify a correlation with psychological issues and caloric intake. Speculative answers abound regarding the overabundance of and Western waste of food in relation to eating disorders. If these people had not enough food would they still mingle their psychological issues with food?

The influence of media stereotypes is powerful, especially among adolescents. The adolescent mind is highly susceptible to the strong message being pronounced to the masses: we must be thin and we must achieve. Since this is the period where the onset of eating disorders occurs, this is also an ideal time to teach stress relieving techniques, empowerment, self-esteem building methods, and good nutrition.

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Nutritional Risk Factors for Chronic Diseases

Kristen Force

A balanced diet of carbohydrates, fats, and proteins should provide all of the nutrients the body needs for optimum physical health. It has also been shown that proper nutritional habits play a significant role in the prevention of chronic diseases. However, any imbalance in nutrient consumption outside the range of moderation, either as a deficiency or an excess of essential vitamins and minerals, can lead to numerous health disorders and improper body function. Therefore, by understanding how the body uses these nutrients, informed choices can be made to preserve both short- and long-term health.

Poor nutritional habits have been shown to increase one's risk for chronic diseases. These habits are often established during youth and carried into adulthood, paving the way for a lifetime of health problems.¹

In 2002, researchers from the U.S. Department of Agriculture conducted a study that attempted to reveal why Americans make bad nutritional choices despite the volumes of beneficial health advice available.² A questionnaire was distributed, asking each individual to rate the healthfulness of his or her food choices. Investigators then compared the participants' answers to their actual diet records. Based on the recommended daily allowances for grains, vegetables, fruits, milk, meat, fat, cholesterol, and sodium, the researchers measured the healthfulness of the diet. Of the 3,000 people surveyed, 40% were classified as "dietary optimists," reporting that their diets were good or excellent when their diet records were scored as poor or needs improvement.²

Throughout the years, adverse health effects have been linked to poor nutritional choices. The body performs best when provided with a moderate amount of all nutrients and disorders tend to occur when an imbalance exists.

Any nutrient consumption outside the range of moderation, whether high or low, can lead to health problems. College students, and Americans in general, face troubles with diets containing an imbalance of too many nutrients, particularly fat and cholesterol, a lack of proper nutrients for the body to maintain its functions, and high amounts of alcohol consumption.

EXCESS CONSUMPTION OF NUTRIENTS **Diabetes and High Blood Pressure**

Improper nutrition can lead to obesity and noninsulin-dependent diabetes mellitus (type 2 diabetes).³ Overweight people are twice as likely to develop this type of diabetes as people who maintain a healthy weight. Type 2 diabetes reduces the body's ability to control blood sugar, making this condition a major cause of premature death, heart disease, kidney disease, stroke, amputations, and blindness.^{3,4}

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Type 2 diabetes, formerly considered “adult onset” diabetes, is now being diagnosed more frequently among children and adolescents.⁴ This new data has been linked to increasing rates of obesity among all Americans, including children. As of January 1, 2003, more than 44 million Americans were considered obese, reflecting an increase of 74% since 1991.⁵ During the same time period, type 2 diabetes increased by 61%, showing a strong correlation between obesity and the development of diabetes.⁵

Studies have shown increased physical activity, proper eating habits, and maintaining control of blood pressure can reduce the complications associated with type 2 diabetes.^{1,4,6} In 2000, the Department of Health and Human Services released survey results that found 27.5% of adults reported that they had participated in no leisure-time physical activity in the past month.⁷ Maintaining a steady blood pressure through physical activity and diet has been shown to reduce the risk of both fatal and non-fatal diabetic complications and reduce deterioration in visual acuity.⁶

Diabetic neuropathies, a family of nerve disorders caused by diabetes, leads to numbness and pain in the hands, arms, feet, and legs. A relatively new treatment being tested to slow this neuropathic progression is the supplement alpha-lipoic acid, also known as thioctic acid.⁸ Clinical trials have shown that this supplement appears to reduce the principal symptoms of diabetic neuropathies when doses of at least 600 milligrams are administered per day. Improvement was seen in motor and sensory nerve conduction in the lower limbs.⁸ A study conducted in the United Kingdom in 2002 showed that alpha-lipoic acid increased glucose uptake by 40 to 80% in diabetic individuals. This result suggests that the supplement can increase glucose uptake in muscle

tissue and improve the response to insulin by resistant skeletal muscles.⁹

Because oxidative stress plays a central role in the progression of diabetic neuropathies, it is thought that alpha-lipoic acid prevents development of hypertension and hyperglycemia through its antioxidative properties.^{10,11} Increases in blood pressure were prevented in rats fed glucose supplemented with alpha-lipoic acid. In the same study, the supplement slowed the rise in insulin levels as well as insulin resistance in the glucose-fed rats.¹¹

Diets high in protein have been linked to heart disease and type 2 diabetes because of their high saturated fat content.¹² Chia-Ying Wang, M.D., PhD, at the University of Chicago in Illinois, conducted a study to test the effects of diets high in protein. Wang found that the study’s subjects showed a higher risk of kidney stones as a result of higher acid levels in the kidneys and lower urinary citrate levels. Also, test subjects had higher levels of calcium in their urine, suggesting a decreased absorption of the mineral that aids in bone growth and an increased risk of developing osteoporosis.¹² Studies have shown that high dietary intake of protein can also aggravate allergies and autoimmune diseases by stressing the immune system.¹³

Salt provides the essential minerals iodine, sodium, and chlorine, but most people consume far more than is needed. The average U.S. citizen eats enough salt to provide 20 times the required daily amount of sodium. This excess of salt is associated with internal homeostatic imbalance and high blood pressure.¹⁴

An excess of water-soluble vitamins, such as folic acid, pantothenic acid, and riboflavin, can be excreted in the urine with little to no harm. However, a surplus of fat-soluble vitamins, such as

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vitamins A, D, E, and K, are deposited in body fat, resulting in an accumulation of these compounds that can rise to toxic levels. Excessive intake of fat-soluble vitamins can include symptoms of nausea, dizziness, itchiness, hair loss, liver damage, and birth defects. Supplements, in pill form, are the most common cause of vitamin excess; dietary sources rarely create an overabundance in the body.¹³

Antioxidant supplements have also been shown to play a critical role in maintaining good health. Pycnogenol is the brand name of an antioxidant supplement that is proven to increase the effect of already existing vitamin antioxidants in the body.¹⁵

Originating from the bark of the maritime pine found in France, the plant extract's main ingredient is proanthocyanidins. The supplement counteracts the action of stress hormones on arteries by increasing the diameter of blood vessels and supporting an improved blood flow. Research has shown that Pycnogenol reduces inflammation in the body, strengthens the vascular system, and lowers high blood pressure and cholesterol.¹⁵

Fat, Cholesterol, and Heart Disease

Fat is a compound in the lipid class of biological macromolecules.¹⁴ The body requires fat for protection of vital organs, insulation, and as an energy reserve. These lipids are found in two configurations: saturated and unsaturated. Saturated fats have hydrocarbon tails with single bonds between each carbon and hydrogen atom. This structure is described as being saturated with hydrogen. An unsaturated fatty acid contains at least one double bond in the tail, formed by the

removal of hydrogen atoms from the carbon skeleton.¹⁴

Most animal fats are saturated and solid at room temperature. A diet rich in saturated fats is associated with cardiovascular diseases, which impede blood flow through the vessels. Unsaturated fats, referred to as oils, are found in plants and fish and are usually liquid at room temperature.¹⁴ High-fat diets and high rates of cardiovascular disease are not always correlated because of the various levels of saturation; eating fewer foods of animal origin and more plant foods, such as vegetables and grains, can actually reduce the risk of heart attack and stroke.¹⁵

Vitamin B12, a water-soluble vitamin, is important in the fight against cardiovascular disease and can be taken in supplement form to avoid deficiencies. The Institute of Medicine recommends that all adults over 50 should take a B12 supplement because of their high incidence of impaired absorption.¹⁶ Elevated levels of homocysteine, an amino acid found in the blood, can indicate an increased risk of heart disease and stroke. Homocysteine has been shown to damage coronary arteries and make it easier for blood to form clots when present at high levels. Ongoing studies are proving the ability of vitamins to lower high amounts of homocysteine and reduce the risk of heart disease.¹⁶

Cholesterol is a waxy, fat-like substance that is both consumed from the diet and produced by the body. Although cholesterol is found in all foods of animal origin, an adequate supply is made in the liver for all the body's needs, including cell membrane construction, the building of brain and nervous tissues, and the production of steroid hormones.^{17,18} These hormones are needed for body regulation, processing food, and making bile acids for digestion.¹⁷ Cholesterol travels in the blood plasma mainly in the form of particles made up of

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thousands of cholesterol molecules and other lipids bound to a protein; excess amounts are eventually deposited in arteries.¹⁸

Cholesterol is composed of two types of lipoproteins: low-density and high-density. Low-density lipoproteins (LDL) are considered the “bad” cholesterol because they are associated with the depositing of cholesterol in arteries as plaques. The primary source of undesirable LDL cholesterol levels is animal products high in saturated fat.¹⁶ High-density lipoproteins (HDL) are considered the “good” cholesterol because they have been shown to reduce cholesterol deposition in arteries.¹³ HDL cholesterol acts as a counterbalance to LDL, carrying blood cholesterol back to the liver where it can be broken down and eliminated.¹⁹

Other cultures have commonly been used to study the effects of fat and cholesterol consumption. Eskimos in Alaska and Greenland were found to be relatively free of heart disease despite a high-fat, high-cholesterol diet. Research showed that the Eskimos’ staple food, fish, was rich in omega-3 polyunsaturated fatty acids. Omega-3 fatty acids have shown to lower both LDL-cholesterol and triglyceride levels in the blood while raising HDL-cholesterol levels.¹⁷ The U.S. Department of Health and Human Services advises consumers to reduce total dietary fat intake to 30% or less of total calories, reduce saturated fat intake to less than 10% of calories, and reduce total cholesterol intake to less than 300 milligrams per day.¹⁷

Nicotinic acid has been shown to lower total cholesterol, LDL-cholesterol, and triglyceride levels when taken in a supplement form. Also known as niacin, nicotinic acid expands the blood vessels and lowers levels of free fatty acids. This supplement has been shown to reduce LDL-cholesterol levels by 10 to 20%, reduce triglycerides by 20 to 50%, and increase levels of

HDL-cholesterol by 15 to 35%.²⁰ Although nicotinic acid is available over the counter, it is recommended that the dosage be closely monitored by a physician to avoid negative side effects, such as liver problems and high blood sugar.^{20,21} Consuming an amount of nicotinic acid above the safe level can also result in nausea, vomiting, and even heart attacks.²² The use of nicotinic acid in individuals with diabetes has been discouraged because high doses can interfere with the control of blood sugar levels.²¹



Atherosclerotic Plaque



Atherosclerosis, the major cause of cardiovascular disease, has been linked to diets high in saturated fats and LDL cholesterol.¹⁴ In this condition, plaque deposits containing fatty substances, cholesterol, and cellular waste products develop on the internal lining of blood vessels, impeding blood flow and reducing the resilience of the vessels.¹⁴ The most serious damage tends to occur when the plaques become fragile and rupture.

Blood clots can form from ruptured plaque deposits, blocking blood flow in vessels. Clots can also travel in the body, blocking vessels to the heart, brain, and appendages.²³ Warfarin, commonly called Coumadin, is prescribed to people with a high risk of forming blood clots. This blood thinner effectively reduces the activity of vitamin K, a

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micronutrient that contributes to blood clot formation. The time it takes for a clot to form is measured and referred to as bleeding time. Individuals displaying unusual thickness in the blood take Coumadin to lengthen the bleeding time by as much as 33%.²⁴

Heart disease, a lack of adequate blood flow to the heart, is the leading cause of death in the United States, accounting for more than 30% of all deaths in 1999.^{23,25} Stroke is the third leading cause of death in the United States and was responsible for one in 15 deaths of Americans in 1998.²⁶ Together, heart disease and stroke are the principal components of cardiovascular disease.^{26,27}

The Center for Disease Control reports that approximately 950,000 Americans die of cardiovascular disease each year, which amounts to one death every 33 seconds.²⁷ Death rates alone underestimate the health effects of these conditions. Almost one-fourth of the population lives with the effects of cardiovascular disease and heart disease is the leading cause of disability among working adults. Lost productivity due to stroke and heart disease in 2001 totaled more than \$129 billion.²⁷

INSUFFICIENT CONSUMPTION OF NUTRIENTS

Vitamins and Minerals

Individuals must consume a diverse diet composed of vitamins, minerals, proteins, carbohydrates, and fats in order to promote both short-term and long-term optimal physical health. Although vitamins and minerals are required in relatively small amounts, deficiencies can cause severe problems in proper body functions. Malnutrition has been linked to anemia, amenorrhea, dehydration, electrolyte disturbances, and people who are underweight are at an increased

risk of osteoporosis.²⁸⁻³¹

A nutrient deficit can be caused by a lack of available food for a given population, an unbalanced diet, choosing not to have a proper intake of food, such as anorexia, and not absorbing and processing nutrients properly, as in bulimia. Researchers agree that a well-balanced diet prevents symptoms of nutritional deficiency, however, vitamin supplements may still be necessary. Although there is debate among scientists regarding vitamin dosage, some believe it is sufficient to meet recommended daily allowances (RDAs), while others believe the RDAs are set too low.¹⁴

There are 13 vitamins identified as being essential to the human diet. These must be taken from the environment and can be found in meats, grains, nuts, dairy products, fruits, and vegetables. Water-soluble vitamins consist of compounds that function in key metabolic processes, such as the removal of carbon dioxide, the maturation of red blood cells, and the synthesis of fat, glycogen, and amino acids.¹⁴ Fat-soluble vitamins have a variety of functions and are involved in preventing cell membrane damage, components of visual pigments in the eyes, and aiding blood clotting.¹⁴

Essential Vitamins

- Vitamin E • Vitamin C
- Vitamin A • Riboflavin
- Vitamin K • Vitamin B12
- Vitamin D • Pantothenic Acid
- Niacin • Vitamin B1
- Folic Acid • Vitamin B6
- Biotin

One of the 13 essential vitamins is vitamin C, a water-soluble vitamin found in fruits and vegetables, especially in citrus fruits such as oranges and grapefruit. A lack of vitamin C, also known as ascorbic acid, can lead to scurvy,

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characterized by the degeneration of skin, teeth, and blood vessels. Individuals who are deficient will also experience weakness, delayed wound healing, and a less effective immune system.¹⁴ Non-specific symptoms associated with vitamin deficiencies can range from constant fatigue to insomnia to irritability and poor concentration.³²

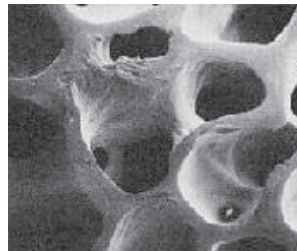
Minerals are simple inorganic nutrients that, like most vitamins, must be acquired from food. The functions of minerals include bone and tooth formation, nerve and muscle function, internal acid-base balance, and glucose metabolism. Similar to vitamins, the dietary sources of minerals are dairy products, dark leafy vegetables, meats and seafood, and table salt.^{13,14}

In humans and other vertebrates, iodine is essential in the production of hormones made in the thyroid gland. These hormones, thyroxine and triiodothyronine, are essential in the proper development of the brain, heart, liver, and kidneys. Inadequate hormone production can lead to consequences such as mental retardation, increased childhood mortality, reproductive failure, and defects in the development of the nervous system. A daily intake of 0.15 milligrams is adequate for normal thyroid activity. An iodine deficiency, common in developing nations, causes the thyroid gland to grow to an abnormal size, a condition called goiter. Adding iodine to table salt, called iodized salt, has significantly reduced the incidence of this deficiency.¹⁴

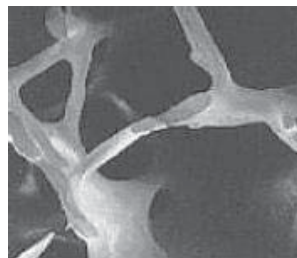
Calcium and vitamin D are important dietary components aimed at building and maintaining healthy bones. Good sources of calcium include low-fat dairy products, dark green leafy vegetables, and calcium-fortified beverages.³³ During bone development, a scaffold of protein is built and filled in with calcium-rich mineral, which adds strength and stiffness. From age 11 to 24, the

body requires approximately 1,200 milligrams of calcium each day.³³ Vitamin D aids in calcium absorption by transporting calcium from the intestines to the bloodstream and into the bones. This vitamin is synthesized in the skin through short, normal day-to-day exposure to sunlight and can be found in foods fortified with vitamin D. Vitamin A, vitamin C, magnesium, and zinc are also needed, as well as protein for the growing bone scaffold.³³

Osteoporosis is a condition in which the bones become less dense and are more likely to fracture. Post-menopausal women and those with a low body weight tend to produce less estrogen, a hormone that promotes bone growth. Low estrogen levels have been correlated to significant losses in bone density.³⁴ Additionally, a decreased production of growth hormones and other growth factors, combined with a calcium deficiency, are contributing factors in women that lead to osteoporosis. Low testosterone levels (hypogonadism), medications that lead to steroid excess, and alcoholism are leading causes of osteoporosis in men.³⁵



(a) Healthy bone



(b) Osteoporotic bone

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While osteoporosis is often considered a woman's disease, many men also suffer from bone thinning. Each year, men total one-third of all hip fractures and often experience fractures of the spine and wrist.³⁵ Often osteoporosis is not a concern for young people, even though preventative measures must be taken early in life. Bone density continues to increase until age 30 in most individuals and then bones slowly lose strength and mass throughout the rest of life. The rate of density change is affected by heredity, sex hormones, physical activity, diet, medications, and lifestyle choices.³⁵

Iron deficiencies can cause anemia, a lack of healthy red blood cells or too little hemoglobin in the blood.³⁶ In addition to an iron-poor diet, common causes of anemia are blood loss, such as during menstruation and gastrointestinal ulcers, and poor absorption of iron from food. Anemia affects the body's ability to maintain enough red blood cells to carry needed oxygen to tissues and organs.³⁶ The National Center for Health Statistics reported that in 1996 approximately 3.4 million Americans were anemic.³⁷ Data shows that people living in the South have higher rates of anemia than in other regions, and anemia is far more prevalent among women than men.³⁷

The Food and Nutrition Research Institute conducted a study in the Philippines to investigate the interactions between micronutrient deficiencies and undernutrition in different age groups.³⁸ Results showed that there was a greater proportion of anemia among the undernourished, judged by weight for age in children and weight for height in adults.³⁸ The study concluded that a strong indicator for anemia was found in communities in which micronutrient deficiencies caused the population to be underweight.³⁸

The most easily absorbed iron is found in animal products, such as red meat, fish, and

poultry. Iron from vegetable sources has a different chemical structure and is not absorbed as well, but can be enhanced by including foods rich in vitamin C, broccoli, cabbage, and tomatoes in the same meal.³⁶

For college students with little time and money, it can be difficult to plan well-balanced meals that include all the necessary nutrients on a daily basis. Are vitamin supplements the answer to meeting the recommended intake values? While a wide range of vitamin supplements are available and have proven benefits, health officials conclude that supplements are no substitute for good eating habits.³⁹ Vitamins are most effective when interacting with mixtures of different dietary components as compared to working in isolation.³⁹ Taking a supplemental vitamin does not achieve the same value as eating the recommended five servings of fruits and vegetables each day.³⁹

Although food has been shown to be superior to supplements, additional micronutrients taken in pill form can be beneficial for some people. Pregnant women are advised to take 400 micrograms of folic acid each day to reduce the risk of neural tube defects. Folate can be found in green leafy vegetables and oranges, but must be added to breads and cereals.³⁸ Some women prefer to take a supplement to further reduce the risk of birth defects. Individuals who are housebound or stay fully covered when outdoors do not get enough sun exposure to make an adequate amount of vitamin D. Supplements are taken for this condition and are most common in older people.³⁹

Amenorrhea, the cessation of a woman's menstrual cycle before normal menopause, has been connected to low body weight and can lead to damaged blood vessels and osteoporosis.^{30,34} While long considered a result of too much activity, amenorrhea is now linked to too few calories and not enough fat stores in the body.³⁰ Researchers suggest that it is not the exercise that hurts women,

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but the fact that they do not properly fuel their bodies for the amount of exertion done.³⁰ Because hormones are partly made from fat, a certain amount is needed in the body for estrogen to properly control the menstrual cycle.¹³

Anne Hoch, D.O., assistant professor of physical medicine and orthopedic surgery at the Medical College of Wisconsin, conducted a study on female athletes with an average age of 21 to assess the effects of athletically-induced amenorrhea on young women. Hoch examined 10 women who had not menstruated for an average of 2.3 years. The study found that these women's arteries were similar to those of 50-year-old women and that the natural ability of their blood vessels to dilate had decreased, which is a risk factor for heart disease.³⁴ It was determined that the small, weakened blood vessels of the young women were caused by a lack of body fat, which leads to an inadequate production of hormones that regulate body function.³⁴

Based on the study, Hoch recommended that a woman who participates in any type of high-level endurance workout, such as running, cycling, or aerobics, for at least one hour each day should consume 45 calories for each 2.2 pounds of body weight she has. That equals about 2,700 calories a day for a 132-pound woman.³⁴

Carbohydrates and Protein

Regardless of a person's exercise level, everyone needs a proper balance of nutrients to maintain optimal health. Humans consume the bulk of their nutrition from three macronutrients: carbohydrates, proteins, and fats.¹³ All three nutrients supply energy while protein also provides the structural components necessary for the growth and repair of tissues.¹³

Carbohydrates include simple and complex sugars, formed from combinations of

carbon, oxygen, and hydrogen. Glucose, the simplest sugar molecule, is used as an energy source for cells and serves as raw material for other types of molecules, such as amino acids and fatty acids.¹⁴ Glucose is the body's first choice for energy. Complex sugars are necessary for digestion and assimilation of other foods and for the breakdown of fat in the liver.^{12,14}

Drastically reducing carbohydrates in the diet is currently a popular weight-loss technique. An insufficient amount of products such as rice, pasta, fruits, and vegetables can create deficiencies for essential vitamins and minerals. This is because carbohydrates are some of the most common sources of these required nutrients.⁴⁰ An inadequate amount of glucose can also lead to dizziness and fatigue. The USDA's Food Guide Pyramid advises making carbohydrates the staple of any healthy diet. Individuals should include 6 to 11 servings of grains, pasta, and cereal each day, depending on caloric need.⁴⁰

Without enough carbohydrates to perform basal metabolic requirements, the body is forced to use other molecules as an energy source.¹² Those seeking weight loss hope to burn fat, but the body also breaks down protein for energy, which can have undesirable effects. When used in metabolism, protein leaves ammonia, a toxic residue and waste product, in the body. This must be eliminated with help from the liver, which converts it to urea, a less toxic form. Removal of urea from the bloodstream by the kidneys requires extra amounts of water and can cause an increased loss of minerals.¹³

A diet containing an insufficient amount of carbohydrates will use protein found in muscle tissue to meet the energy demands of the body, resulting in the loss of lean body mass. While excess protein can be damaging, this macronutrient is critical to maintaining a healthy body. The most complex nutrient, proteins make up most of the

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body weight after water. Proteins aid in the growth and development of all body tissues and provide the building blocks for muscles, blood, skin, hair, nails, and internal organs, including the brain and heart.¹³

Severe consequences can result from a lack of protein, a fact that vegetarians and others who limit protein intake must consider when planning a balanced diet. Inadequate amounts of protein can affect the formation of hormones, which control growth, sexual development, and metabolic rates. The body's water balance and pH levels are regulated by proteins and must be kept in a constant state for proper function.¹³

HIGH ALCOHOL CONSUMPTION

Nutrient Imbalance and Interference with Body Function

According to the U.S. Department of Agriculture, alcohol intake comprises approximately 10% of energy consumption in the United States.⁴¹ While a moderate amount of alcohol has been shown to reduce the risk of heart disease, excessive amounts can lead to serious illnesses that affect all parts of the body.^{42,43} Long-term alcohol use can contribute to liver disease, impaired heart function, and inflammation of the pancreas.⁴³

Individuals who consume high amounts of alcohol frequently neglect other sources of nutrition, such as carbohydrates and protein. Alcohol is an inefficient source of energy with no nutrients to balance the loss of other foods in the diet. Folate, a vitamin that is thought to reduce the risk of heart attack, colon cancer, and birth defects, is not always metabolized correctly in heavy alcohol drinkers. Calcium absorption can also be inhibited, correlating with the increased rate of

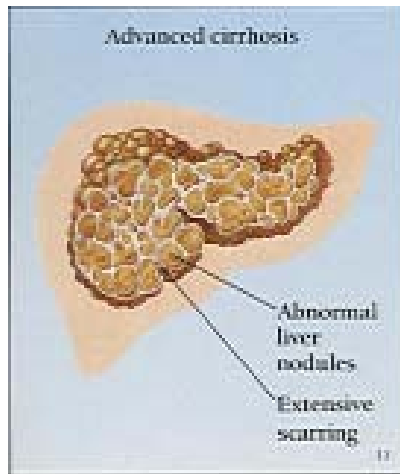
osteoporosis in heavy drinkers, especially women.⁴⁴

When alcohol is ingested, it first encounters the oral cavity, pharynx, and esophagus. Here it is largely undiluted and frequently causes mucosal injuries, such as lesions, in people who drink large amounts of alcohol.⁴⁵ Chronic alcohol abuse increases the incidence of tooth decay, gum disease, and loss of teeth.⁴⁵

Long-term alcohol consumption can impair esophageal motility and weaken the lower esophageal sphincter, resulting in an increased occurrence of heartburn and disorders that mimic symptoms of coronary heart disease.⁴⁵ Alcohol, even in relatively small doses, can interfere with normal stomach function by altering gastric acid secretion and impeding gastric and intestinal motility. Alcoholics have a significantly higher incidence of atrophy of the gastric mucosa and decreased gastric secretory capacity than do healthy subjects of comparable age and sex.⁴⁵ The decrease in stomach acid production results in an inability to destroy the bacteria that enter with food and allows potentially harmful microorganisms to multiply in the small intestine.⁴⁵

The small intestine is responsible for absorbing nutrients into the bloodstream. The presence of alcohol can interfere with the absorption of other nutrients, such as sodium, glucose, amino acids, and fatty acids, while the alcohol is rapidly taken into the blood. Without the proper balance of nutrients, the transport of toxins across the intestinal wall increases and may contribute to liver, pancreas, and kidney damage. Digestive problems, such as nausea and abdominal pain, have been shown to result from a high consumption of alcohol over time.⁴⁵

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The liver is the primary site of alcohol metabolism in the body.⁴³ In humans, alcoholic liver disease progresses from fatty liver to alcoholic hepatitis to cirrhosis. The progression of the disease may be caused by additional risk factors in addition to alcohol due to the fact that only 15 to 20% of heavy drinkers develop cirrhosis.⁴³

In addition to the gastrointestinal tract, alcohol also alters activity in the central nervous system, made up of the brain and spinal cord. Immediately after alcohol is consumed, brain chemistry and the interaction between neurons are disrupted. Just one drink can impair motor coordination, hinder the ability to reason, and cause delayed reactions. Heavy drinking over time can damage the peripheral nerves, leading to pain, numbness, and body tremors.⁴⁴

Because studying alcohol's impact on humans can be both impractical and unethical, researchers utilize animals with a close evolutionary relationship to humans to study the effects.⁴³ In one such study, researchers observed baboons that consumed alcohol with their diets for

several years. One-third of these animals eventually developed cirrhosis of the liver, conclusively demonstrating alcohol's toxicity.⁴³

The effect of long-term alcohol exposure on heart function has been studied through the use of animal model systems. The left ventricle of dogs that received alcohol for 18 months displayed increased scarring of the heart tissue. The increased collagen levels in the dogs suggest that the heart's ability to extend and contract during each heartbeat was reduced.⁴³

Chronic liver disease and cirrhosis combined were the cause of 26,552 deaths in the United States in 2000, as reported by the Center for Disease Control.⁴⁶ Habitual drinking has also been linked to high blood pressure, and increased risks of stroke and heart attack. Alcoholic cardiomyopathy is a condition characterized by the enlargement and weakening of the heart muscle.⁴⁴

CONCLUSION

Nutritional habits play a significant role in the body's health and the prevention of chronic diseases. To achieve optimal physical health, the body requires a specific amount of nutrients, including carbohydrates, fats, protein, vitamins, and minerals. Also important is to properly factor in alcohol and be aware of its risks and dangers before consumption. By understanding how the body uses these nutrients, informed choices can be made to preserve both short- and long-term health. If college students can begin to establish healthy, maintainable habits at an early age, they will provide their bodies with the best defense against chronic diseases, which is prevention. References:

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