BASIC COURSE INSTRUCTOR UNIT GUIDE

32

PHYSICAL FITNESS/OFFICER STRESS

July 1993

THE COMMISSION
ON PEACE OFFICER STANDARDS AND TRAINING

STATE OF CALIFORNIA

This unit of instruction is designed as a *guideline* for performance objective-based law enforcement basic training. It is part of the POST Basic Course guidelines system developed by California law enforcement trainers and criminal justice educators for the California Commission on Peace Officer Standards and Training.

This guide is designed to assist the instructor in developing an appropriate lesson plan to cover the performance objectives which are required as minimum content of the Basic Course.

UNIT GUIDE 32

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Learning Domain 32
Physical Fitness/Officer Stress

COMBATTING THE EFFECTS OF STRESS

Given a direct question, the student will identify the following techniques for combating the cumulative effects of stress:

A. Exercise
B. Diet
C. Change activity
D. Recreation
E. Flight (escape)
F. Prioritize work hours
G. Religious activity
H. Professional counseling

Performance Objective 2.5.3

CURRICULUM

A. It is important that an officer learn to combat the effects of stress

1. First identify the causes of stress

a. Outside help

(1) Counseling
(2) Clergy
(3) Etc.

2. Try to eliminate these causes

a. It is impossible to eliminate all causes. Therefore, find ways to alleviate stress on an individual basis.

3. One of the most popular methods of alleviating stress is through physical activity.

a. Organized sports

b. Running

c. Martial arts

d. Vigorous walking

4. Proper diet is important

a. Fatty food can block the body functions which help to decrease the negative aspects of stress.

5. Neuromuscular relaxation/biofeedback

    a. Techniques attempt to train individuals to control muscular stress by Progressive Relaxation Technique:

        - lie on floor with lights out and meditate.

    b. Quiet time and meditation

    c. Passive and aggressive relaxation

6. Recreation

    a. Fishing, golfing, jogging, bowling, etc.

7. Flight (escape)

8. Prioritize work hours

9. Religious activity

10. Professional counseling

    a. Peer counseling

PHYSICAL DISABLERS OF LAW ENFORCEMENT OFFICERS

Given a direct question, the student will identify the following primary physical disablers of law enforcement officers:

A. Cardiovascular problems
B. Low back injury
C. Peptic ulcers

Performance Objective 12.1.1

CURRICULUM

A. Cardiovascular Disorders

1. Coronary heart disease victimizes over 600,000 Americans annually in the form of a heart attack or myocardial infarction.

2. The most common form of heart attack occurs when a blood clot, or thrombus, clogs a coronary artery already narrowed by arteriosclerosis.

   a. Arteriosclerosis or atherosclerosis results when fatty substances such as cholesterol are deposited beneath the lining of the arteries in the form of plaque.

   b. This deposit leads to a narrowing of the artery and a reduction of blood flow (ischemia).

   c. As the narrowing develops, the oxygen supply to the heart is reduced. The reduction in oxygen supply may affect work capacity without obvious symptoms. As this process continues, the risk of experiencing a heart attack grows.

3. Stress can contribute to the progression of cardiovascular disorders.

4. Peace officers are under a great deal of emotional and physical stress.

5. Although the job may be considered sedentary, many times the officer is required to go suddenly from minimum to maximum effort.

6. Tests have shown that failure to warm up before vigorous activity may result in electrocardiogram abnormalities.

7. Failure to warm up properly may cause a lack of oxygen to the heart muscle. In some individuals this lack of oxygen could account for the occurrence of heart attacks.

8. If a person who is considered fit takes a risk when engaging in physical activity without a warm-up, think how the problem is compounded in emergency situations for an officer who has risk factors. The more risk factors, the greater the chances of developing coronary disease.

9. Evidence of cardiovascular problems is becoming prevalent in younger people, possibly due to dietary trends:

   a. We now have documented cases of coronary heart disease in individuals in their twenties.

   b. Cardiac-related disability claims by safety personnel in their late thirties and early forties are common occurrences.

   c. Since peace officers are in a high risk group, they have an obligation to them -selves, their family, and their agency to reduce their risk factors as much as possible.

10. Hyperlipidemia, increased blood fat, is caused by:

    a. Cholesterol - derived from animal fats

    b. Triglycerides

       NOTE: There is a need to maintain the proper balance of high-density lipoproteins (HDL) and low-density lipoproteins (LDL).

11. Hypertension, or elevated blood pressure, is a serious problem.

    The average blood pressure is 120/80, but it varies with individuals. Each person should know what his/her normal blood pressure is.

12. Contributing factors to heart disease and hypertension include the following:

    a. Tobacco use

    b. Excessive body fat

    c. Physical inactivity

    d. Stress

    e. Caffeine and use of other stimulants

B. Lower back disorders

1. First of all, let us consider musculoskeletal disorders in general and back disorders in particular.

   a. Back disorders are often caused by sudden or heavy exertion.

b. Particular problems occur with the spine or the fibro-muscular structure adjacent to the spine.

2. Most people enter law enforcement as young adults with healthy backs and, by maintaining a well-balanced fitness program, can significantly reduce the chance of lower back disorder.

3. Back disorders are the result of:

   a. Poor physical conditioning

   b. Poor posture and biomechanics

   c. Major and minor trauma

   d. Degenerative changes

   e. Improper weight control

   f. Stress (emotional and environmental)

4. Many lower back ailments are caused by weakening of the abdominal wall muscles, causing shifting of body alignment.

5. The condition may develop slowly, but the pain may manifest itself acutely.

6. Adequate job training preparation, proper conditioning and good exercise programs minimize the risk of disability.

7. Officers must be ready to perform intermittent heavy work involving frequent and strenuous bending, lifting and carrying, as well as pushing and pulling, often from an awkward and unbalanced position. Thus, they must be thoroughly familiar with proper biomechanical techniques.

C. Stomach ulcers: Syndromes of emotional and environmental stresses and strains

1. Identification

   a. An ulcer is an open sore in the skin or mucous membrane that heals slowly. A wound is not an ulcer.

   b. Many people have peptic ulcers (ulcers in the lining structure) in the stomach. Ulcers also occur in the duodenum, which is the part of the intestine that is located immediately below the stomach.

   c. A primary cause of ulcers is failure to manage stress effectively.

   d. Too much gastric juice can also contribute to stomach ulcers.

2. Emotional stress

Emotional stresses and strains to which law enforcement personnel are subjected are very well known.

a. Officers are involved with extremes of human emotion.

b. The work environment is inherently stressful.

c. An individual under continual stress has an increase in blood adrenalin and adrenalin-like products. These are the substances that are produced by the body to get it ready for "flight or fight." They also keep the heart ready, increase the heart rate, increase the contractibility of the heart, and, most of all, use an immense amount of oxygen.

These same adrenalin-like substances are contributing factors in gastrointestinal disorders, stomach ulcers, duodenal ulcers, nervous stomach, and colitis, which are frequent problems experienced by emergency services personnel.

Excess acid in the stomach keeps the ulcer from healing (helps keep it chronic). Ulcers of this kind usually cause pain or distress in the pit of the stomach.

Ulcers may sometimes bleed and are most dangerous when they perforate (eat through) the organ. This condition may lead to peritonitis.

Stomach ulcers are treated with drugs, diet, and stress management. Some ulcers require surgical treatment.

D. Additional related disablers

1. Alcohol use and abuse

a. Medically, alcohol is a depressive, or sedative, drug that slows the activity of the central nervous system.

b. Ethyl alcohol is a colorless liquid with a sharp burning taste. It is the ingredient in alcoholic beverages that causes intoxication.

c. Alcohol rapidly enters the blood stream. Within minutes it can be circulated to all parts of the body.

(1) Absorption, however, is generally slowed by food in the stomach.

(2) Alcohol primarily affects the central nervous system. Alcohol actually deadens control centers in the brain, which results in intoxication.

SHORT-TERM EFFECTS OF ALCOHOL

Given a direct question, the student will identify the following short-term effects of alcohol:

A. Intoxication
B. Impairment of physical exertion

Performance Objective 12.1.2

CURRICULUM

A. Short-term effects

1. Intoxication - Intoxication occurs in six basic stages:

a. The "happy" stage, when the subject is happy, talkative, sociable, and relaxed.

b. The "excited" stage, marked by emotional and erratic behavior.

c. The "confused" state, when staggering, disorientation, and moodiness are prevalent. Frequently, exaggerated fear is experienced.

d. The "stupor" stage, when walking and standing are almost impossible and paralysis is fast approaching.

e. The "coma" stage, with complete unconsciousness and no reflexes. Respiratory paralysis is highly possible, followed by death.

f. The "next day" stage, when the imbiber experiences a hangover and all the attendant symptoms.

2. Alcohol and exercise do not mix

a. Alcohol constricts the arteries, including the coronary arteries, and could cause muscular weakness or heart attack due to blood and oxygen insufficiency during vigorous exercise.

b. It takes one hour for the body to metabolize 1/2 oz. of alcohol. Several hours should elapse between alcohol intake and an exercise session.

LONG-TERM EFFECTS OF ALCOHOL

Given a direct question, the student will identify the following long-term effects of alcohol:

A. Addiction
B. Chronic degenerative diseases, including cirrhosis of the liver, damage to the nervous system, and atherosclerosis.

Performance Objective 12.1.4

CURRICULUM

A. Long-term effects

1. Addiction

a. Addiction is defined as a state of being devoted, habitually or compulsively, to some habit, practice, or pursuit, especially drugs.

b. Early recognition of psychological dependence on alcohol is accomplished by obtaining a history of a drinking pattern. Following is a list of eight symptoms of alcohol drinking that should be looked for in the suspected alcoholic. It should be emphasized that this pattern of drinking is a characteristic that alcoholics have in common, regardless of age.

(1) Preoccupation: The alcohol-dependent person is occasionally preoccupied with the next time she/he will be able to drink.

(2) Increased tolerance: The alcoholic is able to consume greater amounts of alcohol than nonalcoholics.

(3) Gulping of drinks: As with any kind of dependency, the person drinks in a manner that allows the alcohol to act quickly on him/her.

(4) Drinking alone: Sociability is not the important factor.

(5) Use as a medicine: Once the alcoholic receives the rewarding effects of alcohol, he/she often thinks of alcohol as a kind of panacea.

(6) Blackout: The alcoholic has difficulty recalling some of the events of the previous day.

(7) Protection of the supply: Sometimes the alcoholic feels more comfortable if he/she knows that alcohol is available.

Alcoholics feel reassured if they know that there is sufficient alcohol at home, in the trunk of the car, or in the office desk.

(8) Nonpremeditated use: Alcoholics often drink more than they plan to or know they should, or they simply start drinking without even thinking about it.

NOTE: If a person has four or more of the above eight symptoms, it is likely that he/she is an alcoholic.

B. Alcohol can have an adverse effect on health

Although it is possible that drinking less than 2 oz. of alcohol per day may cause no direct harm, continued drinking over a period of years can. Overindulgence and the malnutrition which are symptomatic of chronic alcoholism can lead to cirrhosis of the liver, damage to the nervous system, and other degenerative conditions, including arteriosclerosis.

SHORT-TERM EFFECTS OF TOBACCO

Given a direct question, the student will identify the following short-term physiological effects of tobacco use:

A. Constriction of arteries
B. Changes in blood chemistry

Performance Objective 12.1.5

CURRICULUM

A. Tobacco (both smoking and smokeless) use

1. Short-term effects

Tobacco use severely inhibits the body's ability to absorb and distribute oxygen to sustain normal body functions.

a. Constriction of the arteries, especially the coronary and cerebral arteries

b. Increased carbon monoxide and reduction of oxygen in the blood, resulting in:

(1) Muscle weakness

(2) Increased heart rate

(3) Elevated blood pressure

LONG-TERM EFFECTS OF TOBACCO

Given a direct question, the student will identify the following long-term physiological effects of tobacco use:

A. Addiction
B. Cardiovascular disease
C. Respiratory disease
D. Cancer

Performance Objective 12.1.6

CURRICULUM

A. Long-term effects

1. Addiction

   a. Tobacco use is probably the most addictive and dependence-producing form of object specific, self-administered gratification known to humans.

   b. Patterns of tobacco use parallel patterns of use of other addictive drugs.

2. Effects of tobacco use on the cardiovascular and respiratory systems:

   a. The presently accepted theory is that toxic chemicals in smoke pass through the lungs into the bloodstream. The combination of the action of the toxic chemicals and the constriction of the arteries makes the arteries more vulnerable to atheromatous plaque (arteriosclerosis), especially in the coronary arteries.

   b. All smokers develop emphysema if they continue to smoke and live long enough.

   c. Tobacco users stand a much greater chance of developing cancer of the lungs and other respiratory organs.

3. Smoke streams smoke (smoke directly from the lit end of a cigarette or cigar or the bowl of a pipe) has twice the tar, twice the nicotine, and five times the carbon monoxide as directly inhaled smoke.

   Secondhand smoke (expelled smoke and smoke stream smoke) has been proven harmful to those people breathing it, whether or not they are smokers.

4. It is interesting to know that if a smoker can stop smoking and there has been no irreparable damage, by the end of four to five years the

lungs of that person will be pretty much back to normal. That is good news for smokers who plan to quit.

SUBSTANCES WHICH HAVE THE POTENTIAL FOR ABUSE

Given a direct question, the student will identify the following substances in addition to alcohol and tobacco which have the potential for abuse:

A. Caffeine
B. Prescription drugs
C. Non-prescription drugs
D. Illegal drugs

Performance Objective 12.1.7

CURRICULUM

A. Substance abuse

Although some of the following substances may have legitimate uses (when used properly and in appropriate doses), there exists a danger of overuse/abuse, which could lead to health hazards and addiction.

1. Caffeine (soft drinks, tea, coffee, chocolate)
2. Prescription drugs
3. Nonprescription drugs
4. Illegal drugs

PROGRAMS FOR PREVENTING HEART DISEASE

Given a direct question, the student will identify the following elements of a program for preventing cardiovascular disease:

A. Aerobic exercise
B. Weight control
C. Nutrition
D. Smoking cessation
E. Stress management

Performance Objective 12.2.1

PROGRAMS FOR PREVENTING STOMACH ULCERS

Given a direct question, the student will identify the following elements of a program directed to the prevention of stomach ulcers.

A. Stress management
B. Nutrition
C. Aerobic exercise

Performance Objective 12.2.3

CURRICULUM

A. Disablers are:

1. Cardiovascular disease
2. Lower back injury
3. Stomach ulcers

B. The elements of a program to prevent these disablers must include:

1. Abstinence from tobacco
2. Avoidance of excessive alcohol or other substance abuse
3. Regular aerobic training
4. Proper nutrition and body composition
5. Effective stress management program
6. A flexibility program with emphasis placed on stretching the lower back

EFFECT OF FOOD ON BODY COMPOSITION

Given a direct question, the student will identify the general effect the following basic food constituents have on body composition:

A. Proteins
B. Carbohydrates
C. Fats

Performance Objective 12.3.1

CURRICULUM

A. Effect of nutrition on body composition

Foods and liquids provide the fuels necessary for energy, which enable our bodies to perform optimally, both mentally and physically, each day. We are what and when we eat. There is no safe, quick way to lose weight. There is no magic diet or miracle food. In order for a weight loss or a weight maintenance program to be successful, the nutritional plan must be well balanced and combined with a regular aerobic exercise program.

The goal of this section is to provide the individual with safe and sound guidelines for a healthy lifelong eating plan.

The general overview of the nutritional plan consists of a daily percentage intake of fats, complex carbohydrates, and proteins. Of the daily calories consumed by an individual, 25% or less should consist of fat, 12%-18% should consist of proteins, and the remaining calories should consist of complex carbohydrates. For example, a daily caloric intake of 1,500 calories would consist of 20% fat (300 calories), 15% protein (225 calories); and 65% complex carbohydrates (975 calories).

Overall, this nutritional program consists of the following changes:

1. A significant reduction in one's present intake of fat
2. A moderate reduction in protein intake
3. An increase in complex carbohydrate intake (whole grains, fruits, and vegetables)
4. An increase in fiber intake
5. A reduction in refined sugar intake
6. A reduction in caffeine and alcohol intake
7. An increase in water intake

Basically, practical nutrition guidelines that promote these new life-style habits will be incorporated throughout this guide.

Nutrition may be defined as the science of nourishing the body properly--adequately providing for its growth, maintenance, and repair. To nourish the body, foods must contain substances that do one or more of the following: furnish body fuel; provide materials for the building or maintenance of body tissues; and supply substances that act to regulate body processes.

Six kinds of nutrients which are necessary to the body are:

1. Carbohydrates
2. Fats
3. Proteins
4. Water
5. Vitamins
6. Minerals

CARBOHYDRATES (65% or more of daily caloric intake)

Carbohydrates, fats, and proteins are fuel nutrients that supply energy. Carbohydrates are the most abundant nutrients in foods. One of the principal roles of carbohydrates in the diet is to supply energy in the form of blood glucose. Carbohydrates are divided into two classes: (1) the complex carbohydrates, of which starch is the most familiar example; and (2) the simple carbohydrates, of which ordinary table sugar is the best example. Of the simple carbohydrates, six common sugars are found in foods: glucose, fructose, sucrose, galactose, lactose, and maltose. Complex carbohydrates consist of starches, glycogen, and cellulose (fiber). Some examples of complex carbohydrates are grain products--breads, cereals, pasta; beans; peas; and legumes; tubers--potatoes and yams; casaba; bran; and fruits. Complex carbohydrates are broken down into glucose units in approximately one to four hours after a meal and, consequently, provide more sustained energy to the body.

FATS (25% or less of daily caloric intake)

Fats are actually a family of compounds that include both fats and oils. Fats have a very high fuel value. An excess intake of fat is stored in the body as body fat. Excess energy value of the meal program, whether taken in the form of fat, carbohydrates, or protein, is converted into body fat and stored in fatty tissues in various parts of the body.

Fats of animal origin are relatively high in saturated fatty acids. Of the animal foods, poultry and fish are the lowest in saturated fat and are a better choice than red meat. Vegetable fats, on the other hand, have a

much lower content of saturated fatty acids and a higher content of unsaturated fatty acids. Corn, cottonseed, soybean, safflower, sunflower, and wheat germ oils are especially high in polyunsaturates. Eating an excess of saturated fat foods, such as beef and pork, or butter and cheese, may elevate cholesterol levels in the arteries. Consuming less saturated and more polyunsaturated and monounsaturated fats is thought to be effective in reducing the risk of heart disease. Because fats have such high caloric value (over twice that of equivalent weights of carbohydrate or protein), fairly small amounts of one or two rich sources of linoleic acid would suffice to meet the adult required daily amount (RDA).

PROTEINS (12%-18% of daily caloric intake)

Proteins are present in all living tissues--plant or animal--and are essential to life because they are a vital part of every cell. Proteins are made up of great numbers of relatively simple nitrogen-containing compounds called amino acids. In a protein, 21 to 23 different amino acids are present and are linked together in a great variety of ways. The role of protein in food is not to provide body proteins directly but to supply the amino acids from which the body can build and repair its own cells. There are eight essential amino acids that the body cannot make at all. To make body protein, a cell must have all 21 to 23 amino acids available simultaneously. A complete protein is a protein that contains all of the essential amino acids; it may or may not contain all of the nonessential amino acids. Therefore, it is important to know which foods contain complete proteins or how to combine or supplement various protein foods to make a complete protein. Some examples of foods that contain complete proteins are fish and milk. Fish and poultry are the preferred animal sources of protein because they are lower in fat than other flesh foods. Low fat and nonfat dairy products are preferable to whole milk products. Foods which do not contain complete proteins may be supplemented with other grains and vegetables to make complete proteins. Any meal plan that contains complete proteins, whether derived from animal sources or by combining vegetables and grains, is adequate with respect to protein.

WATER

Water serves as an important regulating substance in the body, and an individual could live only for a few days without it. Water holds substances in solution in the blood, digestive tract, and tissues and assists in regulation of excretion, circulation, body temperature, and many other body processes.

Usually, more water is excreted by the kidneys in the urine than by other channels (lungs, skin, and stools), but in hot weather, a larger amount is thrown off in perspiration in order to assist in regulating body temperature.

Water replacement can be made from several sources:

1. Liquids, such as beverages and soups

2. Solid foods which contain water, such as fresh vegetables, milk, fresh fruits, cooked oatmeal, and some breads

The best source of water replacement is pure water (rather than coffee, tea or sodas). About eight 8-oz. glasses daily are recommended. An individual involved in an exercise program requires additional water replacement. It is recommended that water be taken according to a schedule rather than by perceived thirst. Perceived thirst indicates that some dehydration has already taken place.

VITAMINS AND MINERALS

Vitamins and minerals have long been associated with mystique and fallacy. Many people believe that large doses of certain vitamins and minerals can cure anything from depression to cancer. The fact is, there is not much, if any, scientific evidence that supports miracle cures with the use of vitamins and minerals. Even though vitamin companies would like the public to believe in vitamin miracles, the people taking large doses are actually doing harm to themselves.

The following is background information on vitamins and minerals:

Vitamins are divided into two classes: fat soluble (A, D, E, K) and water soluble (C, B Complex). The main differences between fat soluble and water soluble vitamins are:

1. Fat soluble vitamins are absorbed from the intestine along with fats and lipids in foods. Water soluble vitamins dissolve in water and are assimilated by the body as needed.

2. Excesses of fat soluble vitamins are stored in the body, whereas excess water soluble vitamins are excreted in the urine.

3. Fat soluble vitamins are more stable under heat than the water soluble vitamins and are less likely to be lost in the cooking and processing of foods.

Fat soluble vitamins and trace minerals are stored in the body and can reach toxic levels quite easily. Therefore, extra caution must be taken with respect to dosage.

Vitamins and minerals are necessary in the digestion of food and for the body's normal growth and good health. Yet, they are just one part of good nutrition. One must realize that supplementation is not a substitute for healthy eating habits. So what is recommended is a positive approach to supplementation. Again, it is stressed that vitamins are not magical cure-alls but essential members of food intake that aid in processing the food for the body. So, to ensure that processing is carried out in a healthy manner, a vitamin supplement that provides 100% (or close to it) of the RDAs of the vitamins and minerals is recommended.

Since people do not always eat right and tend to base their diets on quickly available, highly processed fast foods, a supplement can correct imbalances resulting from poor eating habits. Remember, supplements can never take the place of a healthy diet of fresh and unrefined foods.

FOODS HIGH OR LOW IN PROTEINS, CARBOS OR FATS

Given a direct question, the student will identify commonly eaten foods that are either high or low in:

A. Proteins
B. Carbohydrates
C. Fats

Performance Objective 12.3.2

PRINCIPLES FOR MANAGING BODY COMPOSITION

Given a direct question, the student will identify the following principles of proper body composition management:

A. Percent body fat
B. Nutrition
C. Physical activity

Performance Objective 12.3.3

CURRICULUM

A. Effect of exercise on body composition

Any type of physical activity burns calories. The nature, intensity, and duration of the activity determine the number of calories that are burned. In this sense, any type of physical activity could potentially affect body composition. However, different types of physical activities produce changes in the body that also affect body composition in addition to the caloric deficit they create.

General physical activity, including many recreational activities such as baseball and basketball, will burn calories. Increasing the level of physical activity in one's every day life could, in the long run, have a beneficial effect on body composition.

Strength training activities such as weight lifting and calisthenics tend to increase muscle mass. While these types of exercises are not the best way to burn a lot of fat, body composition can be affected by the increase in lean body mass muscle. For example, if the amount of fat in the body stays the same and lean body mass increases, even though body fat has not been reduced, the ratio has changed. Thus the total body fat percentage has gone down. This increase in lean body mass also raises the resting metabolic rate.

Aerobic activities such as walking, bicycling, running, and jumping rope are the best way to reduce overall body fat percentage. This is true for

several reasons. First, this type of activity relies primarily on a combination of oxygen and fat for fuel, rather than other types of fuel that are stored in muscle tissues. Second, aerobic activities, when performed regularly over a period of time, produce metabolic changes. This results in an increased burning of fat, not only while exercising but also while at rest. These changes occur only as a result of aerobic activities. They can be enhanced by lengthening the duration and frequency of the workouts and keeping the intensity of the workouts moderate. For example, running 3 times a week at a 7-minute pace for 20 minutes will not have as great an effect on the body composition as running 5 times a week at a 9-minute pace for 40 minutes. The key is to increase the frequency and duration of aerobic activities, not the intensity, to control body composition.

B. Dispelling common myths

Popular weight-loss myths:

1. FAD DIETS -

FALLACY. Fad diets work. Weight can be lost fast and kept off.

FACT:

a. Any significantly calorically restricted diet will produce a loss of body weight.

b. There is NO value to certain foods (or combinations) over any other in terms of promoting fat loss. There are no miracle fat-burning foods.

c. The more rapidly a person loses body weight by dieting, the more likely he or she will regain the weight after going off the diet.

d. Dieting actually causes the body to lower its metabolic rate, resulting in an increased tendency to regain and store fat.

e. The weight lost through fad dieting is composed of water, lean mass (muscle tissue) and fat. The weight gained after going off the diet is mostly fat.

f. Over 90% of the people who lose weight through fad diets regain the weight within a year.

2. SWEATING -

FALLACY: Fat is burned when one sweats; therefore, increasing perspiration will increase fat loss.

FACT:

Fat boils at 360°F. Sweating is the body's primary mechanism for maintaining its core temperature at 98.6°F. The sweat needs to evaporate in order for this mechanism to function properly. Plastic suits or heavy clothing forces the body to sweat profusely as it struggles to stay cool. The resulting rise in body temperature can cause heat prostration, heat stroke, brain damage, and death. All water lost through sweating must be replaced by ingesting fluids and food. Sweating does not increase fat loss. During exercise one should always wear appropriate clothing for the temperature and humidity conditions.

3. MUSCLE TO FAT -

FALLACY: One should not develop muscles because they will turn to fat when exercise is discontinued.

FACT:

Muscle and fat are two entirely separate tissues, neither of which can turn into the other. Muscle tissue can be gained and fat tissue lost primarily through proper nutrition and regular exercise.

Muscle tissue can be lost and fat tissue gained primarily through improper nutrition and lack of exercise.

4. SPOT REDUCING -

FALLACY: It is possible to spot-reduce fat at specific locations on the body either by exercising the area (e.g., sit-ups for abdominal fat) or by the use of devices such as body wraps.

FACT:

There is NO way to spot-reduce fat except for surgical removal. When a particular muscle group performs work that requires fat for energy, the fat may be taken from ANY storage site. In other words, while one is doing 300 sit-ups, the body may be using fat from the legs or arms.

The best way to reduce total body fat is by large muscle aerobic exercise that lasts more than 40 minutes and is performed on a frequent basis (5-7 days a week).

Wearing elastic wraps around certain parts of the body will cause water to be flushed from that area through profuse sweating. The water loss is quickly replaced shortly after removal of the device, and no fat is burned through the use of these wraps.

5. DIET PILLS -

FALLACY: Taking "diet" pills will result in safe long-term fat loss.

FACT:

Diet pills are not considered safe by most experts and do not result in permanent weight loss. For any diet pill regimen to be effective for a lifetime, it would be necessary to take the pills for life. Considering the potentially harmful side effects and lack of proven effectiveness, it is impossible to recommend ANY form of diet pill as a healthful method of weight control.

C. SUMMARY

Scale weight is not the best measure of fitness. Body composition, or the amount of your body weight that is fat, is a better measure of fitness. This is often expressed as body fat percentage. Obesity (being over fat) has become a national health problem in the U.S. It increases the risk of developing heart disease and high blood pressure and is associated with many other diseases.

The best way to control body fat percentage is through proper nutrition and exercise. A prudent diet, well balanced and low in fat, combined with a regular aerobic exercise program will have the biggest effect on body composition.

Adopting healthy eating and exercise habits for a lifetime is the key to achieving and maintaining body composition changes.

A. Introduction

1. This section is intended to help the student to understand the principles of body composition and how body composition relates to optimal health and longevity. The discussion will emphasize effective strategies for long-term weight control.

B. Body composition

1. When discussing body composition, it is helpful to divide the body's tissues into two categories - fat tissue and nonfat tissue. The nonfat tissue
(or lean body mass) includes blood, bone, muscle, and organ tissue. The fat tissue includes essential fat, which is necessary for physiological health, and storage fat, which is an energy reserve.

It is important to understand that lean mass is metabolically active tissue. Active tissue is tissue that is constantly using calories, even while the body is at rest. Fat tissue, on the other hand, is inactive tissue. Fat tissue is stored energy waiting to be used by the body's active systems.

2. Overweight and overfat

It is important to understand that a person can be overweight, according to accepted height and weight tables, and not be overfat. Conversely, it is also possible to be at ideal weight on these tables and yet actually be overfat.

Scale weight only tells how much a person weighs. It does not tell anything about the composition of what is being weighed. The scale does not tell anything about the amount of lean body mass compared to body fat.

C. Determination of body fat

Body fat, rather than body weight, is a more accurate indicator of the fitness level of an individual. The amount of fat in the body is commonly expressed as a percentage of total body weight; as mentioned earlier, it is called percent body fat.

The oldest and easiest method of assessing body fat is to look at one's nude body in the mirror. Since about 50%-70% of the body fat is stored near the surface of your skin (subcutaneous fat), it should be noticeable if one has too much body fat. In addition to the mirror test, an individual can pinch the skin gently between the thumb and forefinger on various (designated) parts of the body. In general, if the fold of skin and fat on any part of the body is thicker than 3/4", then the individual has too much body fat. Tables are available for use in converting skinfold thickness into percent of body fat for men and women.

A number of more scientific methods can be used to measure body fat rather than by just looking at oneself in the mirror or by giving oneself the pinch test. However, in order for a method to be effective, the same method should be used to pretest and posttest the individual.

Other methods of measuring an individual's percent of body fat are skinfold calipers, bioelectrical impedance testing, or underwater (hydrostatic) weighing. For the purpose of this course, the simplest and most useful method is the skinfold caliper test. The skinfold calipers are used to measure more accurately the thickness of the skin (and underlying fat) in designated areas. The measurements are then converted to a percent body fat by means of a formula designed to include age and sex.

D. The importance of weight control

Obesity has become a national health problem in the United States. Obesity with reference to the amount of fat on a body (percent body fat) may increase the risk of developing other physical complications and diseases. Some diseases of the heart and the circulatory system are associated with obesity. Obesity may contribute to high blood pressure, high heart rate, arteriosclerosis, diabetes, kidney and liver problems, osteoarthritis, gall bladder disease, and cancer. Overfat pregnant women tend to experience more complications during delivery and are more likely

to deliver a stillborn baby. Being overfat is not only harmful physically but also psychologically and socially.

The optimal, or ideal, percent of body fat for an individual is that which is conducive to optimal health. Presently, researchers cannot agree on exactly what those optimal values are for a given individual. However, most health authorities estimate that the optimal range of percent body fat is 10%-18% for a male and 15%-25% for a female in the United States. The average male's percent body fat is approximately 30%. An overfat person is generally an individual who weighs 10% or more than the desired or ideal weight.

On the other hand, excessively low body fat can cause some abnormality and irregularities. For example, women who reach a body fat level under 14%-15% may experience some menstrual changes and pregnancy complications. (Men and women both are more likely to experience more respiratory complications and infectious diseases.) Excessively low body fat levels for males are levels of body fat under 6%. Those individuals with less than the optimal values may experience colds more readily also.

E. Control of body fat percentage

The most effective means of controlling body fat are the combined practices of good nutrition and regular exercise. Neither one alone can be as effective as the combination of the two. Proper nutrition and exercise make a good one-two punch when fighting the battle of the bulge.

While the world worries about where to get enough fuel to heat homes and run machines in the coming decades, millions of Americans will suffer from an energy crisis in reverse: an overabundance of fuel for the body's needs. The result is overfat.

America is not only a nation of "fatties" (an estimated 40% of the population is overweight by at least 5 to 10 pounds) but also a nation of fad dieters. It may take an American ten years to notice the spare tire around his/her middle, but he/she usually wants it off by morning, without pain or deprivation. Fad diets promise such miracles, so it is not surprising that it's a rare best seller list that does not include at least one revolutionary, no fail diet book. But if each of these diets is 100% successful, why do new ones crop up almost daily? And why do 90% of those who try them fail to keep weight off?

Think of the body as a car. Fuel put into the car produces energy to move the car. The amount of fuel stored in the car is limited by the size of the car's gas tank. With the body, the food, measured in calories, is fuel. Unlike the car's gas tank, however, the body can store large amounts of fuel as fat. When the body needs fuel, it breaks down and uses the stored fat.

How much fat the body stores depends on one's caloric intake and expenditure. The intake is determined by the types and quantities of food eaten. The expenditures are determined by the amount of caloric burning

activity of the body. If caloric intake is higher than expenditure, the excess is stored as fat. If expenditure is higher than intake, the body will need to break down and burn stored fats, resulting in a loss of body fat.

The following are a few basic guidelines that one should keep in mind about caloric intake:

1. The average man needs approximately 2,800 calories a day to maintain weight.

2. The average woman needs approximately 2,100 calories to maintain weight.

If one wanted to lose 2 lb. a week (just by limiting calories), one would have to cut his/her daily intake by 1,000 calories (3,500 calories equal 1 lb).

Imagine the results that can be obtained by combining proper nutrition with a regular exercise program. Consider the following exercises:

1. Walking (3.5 mph) burns approximately 5 calories per minute.

2. Bike riding burns approximately 8 calories per minute.

3. Swimming burns approximately 11 calories per minute.

4. Running burns approximately 15 calories per minute.

If a person runs 30 minutes three times a week, he/she can burn off approximately 1,350 calories, or about one-half of a pound of body fat.

Again, it is the combination of good nutrition and a regular exercise program that will allow a person to control his/her body fat.

SELF-EVALUATION OF PERSONAL FITNESS

Given a direct question, the student will identify methods of self-evaluating personal fitness levels in the following areas:

A. Cardiovascular fitness
B. Flexibility
C. Muscular strength
D. Muscular endurance
E. Body composition

Performance Objective 12.4.2

CURRICULUM

A. Exercise heart-rate determination:

1. To determine exercising heart rate, use the following formula:

220-Age X 0.8 = * Exercise Heart Rate

An alternative method of determining the exercise heart rate is presented in Appendix C.

B. Body composition testing

1. Behnke method

a. The Behnke Method uses simple tape measurements to calculate how much the adult body should weigh.

b. This method best applies to those who are overweight. When a person is already close to his/her optimal weight, it may not be quite as accurate a measurement.

c. Procedure

(1) Take measurements while relaxed and standing.

(2) Use the smallest circumferences at the wrists and ankles and the largest circumferences at the calves and forearms (but not flexed).

(3) Take the measurements in centimeters.

NOTE: Have students take measurements of selves and enter totals.

C. Cardiovascular tests for personal evaluation

1. Cureton's breath-holding test

   a. Method of testing respiratory capacity, which is related to circulatory fitness.

   b. Step onto and off a chair, bench, or stool (approximately 12 inches high) for a period of one minute.

   c. Hold breath for at least 30 seconds.

   d. If not possible, it is an indication that cardiovascular function has deteriorated below a desirable level.

2. Kasch Pulse-Recovery Test (three minutes)

   a. This test can be performed by either sex and almost any age group. Only the infirmed or the extremely unfit would find it too strenuous. Persons being tested should not smoke for one hour or eat for two hours prior to taking the test. Also, they should rest for five minutes before taking the test.

      NOTE: Equipment needed includes a 12" bench or stool; clock or watch with sweep second hand.

   b. Procedure:

      (1) Start stepping onto and off the bench when the sweep second hand is at 11.
      (2) Step 24 per minute - total 72.
      (3) Duration is three minutes.
      (4) Stop stepping after three revolutions, when the sweep second hand is again at 11, and sit down.
      (5) Start counting the pulse rate when the sweep second hand reaches 12 on the clock, using either the artery located inside the wrist or the carotid artery in the throat. Count for one minute.
      (6) Compare the pulse count for one minute with the following scale:

Classification	0-1 Min. Pulse Rate After Exercise
Excellent	71-78
Very Good	79-83
Average	84-99
Below Average	100-107
Poor	108-118

3. Cooper's 1.5 mile Walk/Run Test (from New Aerobics)

   a. Find a place where one can run/walk a measured distance of up to 1.5 miles. A quarter-mile track at a local school would be ideal; however, a nearby park, field, or quiet stretch of road can be used.

   b. Try to run the entire distance at a pace that can be maintained without excessive strain. If one's breath becomes short, walk until it returns to normal, and then run again.

   c. Keep going for the full 1.5 miles.

ACTIVITIES WHICH PROMOTE PHYSICAL FITNESS

Given a direct question, the student will identify activities for each of the following elements of a personal physical fitness program that can be performed by an officer while off duty.

A. Cardiovascular
B. Muscular strength
C. Flexibility
D. Muscular endurance

Performance Objective 12.5.1

BASIC PRINCIPLES OF CONDITIONING

Given a direct question, the student will identify the following basic principles of conditioning:

A. Progression
B. Specificity
C. Frequency
D. Overload
E. Duration

Performance Objective 12.5.2

COMPONENTS OF AN EXERCISE SESSION

Given a direct question, the student will identify the following components of an exercise session:

A. Warm-up
B. Conditioning period
C. Cool-down

Performance Objective 12.5.3

CURRICULUM

A. A police officer has an obligation to himself/herself, his family, and to the public to maintain a reasonable degree of physical fitness.

NOTE: Refer to the Basic Academy Physical Conditioning Manual

1. The job often requires officers to extend themselves physically.

   a. Arrest and control situations

   b. Extended work hours

c. Job-related stress

B. The goal of an individual physical fitness program is to enhance the officer's physical and mental well being both on duty and off duty. Such a program should include:

1. Exercises designed to increase:

a. Muscular strength and endurance

b. Flexibility

c. Cardiovascular capacity

2. Balanced nutrition

C. The exercise program

1. The exercise program is divided into three stages:

a. Beginning

b. Intermediate

c. Maintenance

2. Each stage consists of two sections:

a. Musculoskeletal, which includes stretching and strengthening exercises

b. Cardiovascular

3. Prior to beginning an exercise program, the individual should determine his/her level of physical fitness. Ways to determine that level of fitness include the aforementioned Cureton Breath-Holding Test, the Kasch Pulse-Recovery Test, or Cooper's 1.5 Mile Walk/Run Test.

D. Once a fitness level is ascertained, the individual should tailor an exercise program around the following exercises:

1. Musculoskeletal section (beginning, intermediate and maintenance levels)

a. Stretching exercise - 5 minutes

(1) Lateral bending - 4-count exercise - 10 times

Purpose: Stretching action helps to improve the condition of the muscles used for stabilizing the trunk and reduce the

injury potential on the sides of the trunk as well as increasing lateral flexibility of the spine.

(a) Standing position, feet at shoulder width, arms at sides.

(b) Exhale as the fingers slide down the outside of legs. Bend first to the left and then to the right as far as possible.

(c) Gradually try to stretch a little further as flexibility increases.

(d) Stretching movements should be slow and controlled.

b. Long sit stretch-repeat 10 times - 4-count exercise

(1) Purpose: To stretch the hip extensor muscles and lower back muscles and increase flexibility in the spine

(2) Sitting position, legs extended, hands grasping legs at underside of knees

(3) Keeping the legs straight, exhale as the arms pull the trunk forward towards the knees; inhale as the legs return to the starting position.

(4) The pull with the arms should be slow and controlled.

c. Alternate knee pull

(1) Purpose: To stretch hip and back extensor muscles

(2) Lie on back, feet extended, hands at sides. Pull right knee to chest; grasp with both arms and hold for 5 counts.

(3) Repeat with left leg.

(4) Do 7 to 10 repetitions with each leg.

d. Modified Indian curl

(1) Purpose: To stretch the muscles of the groin and lower back

(2) Sit with legs flexed and soles of feet together. Slowly bend trunk forward and grasp toes and hold for 10 counts.

(3) Do 8 to 10 repetitions.

2. Strengthening exercise (beginning, intermediate and maintenance levels)

a. Hip Roll - Repeat 10 to 15 times to each side.

(1) Purpose: To strengthen muscles on sides of the trunk which twist and help to stabilize the trunk.

(2) Lying on the back, knees bent, feet off the floor next to the buttocks, with hips flexed and arms to sides.

(3) Exhale as the legs, kept together, are lowered to the floor, first to the left - return to center - and then to the right.

(4) Return to the center position.

(5) Repeat the exercises to the right and left.

b. Hips up - abdominals - repeat 10 to 20 times.

(1) Purpose: To strengthen the trunk flexor muscles, using the resistance of the legs and hips

(2) Lying on back, hips flexed 90 degrees, knees bent slightly, legs extended vertically, the arms extended in line with the trunk on the floor

(3) Raise only hips from the floor, keeping the upper back down on the floor.

(4) Exhale as the hips are raised, and inhale as they are lowered.

c. Sit-up

(1) Purpose: To strengthen abdominal muscles

(2) Lie flat on the floor, with the legs bent at the knees and feet flat on the floor.

(3) Hands are folded over the chest.

(4) Curl up to an angle of 30 degrees and then return to starting position.

d. Push-up - repeat 10 times - 2-count exercise

(1) Purpose: To strengthen arm extensor, shoulder, and upper chest muscles.

(2) Front leaning rest position with the body straight

(3) Inhale as the body dips to floor. Exhale as the arms are extended.

(4) Resistance on arm muscles can be increased by the buddy system. A fellow officer can hold his/her partner's feet above the floor, gradually increasing the height above the floor as the partner is doing push-ups. This can also be done by placing the feet on the rungs of a ladder while doing push-ups.

e. Rope pull - tug-of-war - 10 times

(1) Purpose: To strengthen arm flexor, hip extensor, and knee extensor muscles

(2) Standing stabilized and facing the partner, grasping handles of rope

(3) One partner starts with the arm bent and the other straight.

(4) One partner pulls as he/she exhales; the other inhales as he/she resists in bending and straightening arms.

(5) Use a 2 count.

Variation: 15-second tug -- partners face each other with arms straight; on command, each one pulls on the rope for a period of 15 seconds. Partner offers suitable resistance.

3. Cardiovascular section

a. Interval Training Procedures - Beginning Level (0-3 Months)

Exercise	30 seconds	Rest 30 seconds
Exercise	30 seconds	Rest 30 seconds
Exercise	1 minute	Rest 30 seconds
Exercise	1 minute	Rest 30 seconds
Exercise	2 minutes	Rest 1 minute
Exercise	2 minutes	Rest 1 minute
Exercise	3 minutes	Rest/Count Pulse

(1) In the Beginning Level, it is advisable to count the pulse rate during each of the rest periods so that the heart rate does not exceed the age-adjusted exercise heart rate. This is accomplished by controlling the intensity or the speed in performing the exercise.

(2) Count the heart rate (10-second pulse count times 6) at the end of the longest exercise period (3 minutes). This count estimates the highest heart rate achieved during that particular exercise; hence, it is called the exercise heart rate. It should be taken as soon as the exercise is stopped.

(3) Next, walk for 2 minutes and then count the pulse rate (10-second count times 6) at exactly 2 minutes. This is the 2 minute recovery heart rate.

(4) Compare these heart rates with the age-adjusted rate. If the counts are higher than the recommended rates, decrease the intensity of the exercise or vice versa.

(5) All heart rate counts should be taken in the standing position; however, if any dizziness is experienced, sit or lie down. Emphasize exhalation during the exercise period; avoid breath holding.

b. Cardiovascular exercise - To improve heart and lung function

(1) Rope skipping

(a) Use interval training procedures as indicated above.

(b) This particular activity stresses the calf muscle group in the legs.

(c) Increasing the tempo will increase the intensity of the exercise.

(d) Breathing: Emphasize exhalation.

(2) Bench stepping

(a) Use interval training procedures as indicated above.

(b) This particular activity stresses the knee extensor muscle group.

(c) Increasing the height of the bench increases the stress on the muscle group and the intensity of the exercise.

(d) Breathing: Emphasize exhalation.

(e) Stepping Rate - 40 times per minute or 3 steps every 5 seconds

(3) Jogging or running in place

(a) Use interval training procedures as indicated above.

(b) This particular activity requires space. However, when space is not available, stationary running may be substituted.

(c) Breathing: Emphasize exhalation.

(4) Cycling

(a) This activity requires a bicycle, stationary or regular, with a control to increase or decrease the resistance on the pedals.

(b) Breathing: Emphasize exhalation.

(c) Stationary bicycle

1) Adjust the resistance control knob so that the brake pads just slightly touch the rim of the wheel. Turn the wheel by hand to make this adjustment.

2) Adjust the seat height. Sit with the full body weight on the bicycle seat. Place the ball of the left foot on the left pedal and push the pedal to its lowest position. With the left leg extended, ball of the left foot on the pedal, the heel of the left foot should extend approximately one inch below the left pedal. Adjust the height of the seat to attain this position.

3) Now, exercising may begin. Gradually increase pedal speed to approximately 15-20 miles per hour. At the end of 5 minutes, stop pedaling and immediately count the pulse rate for 10 seconds. Multiply the count times 6. The count should be approximately 120 beats per minute.

4) By counting how many times the heart beats in 1 minute, one can tell how hard his/her heart is working. An accurate count is sometimes difficult to make over a 1-minute period while exercising; it is suggested that a 10-second pulse count be taken immediately after exercise to estimate the heart rate during exercise. Adjust the resistance control knob to increase resistance, and resume pedaling. Pedal for 5 more minutes, stop, and again count the pulse.

5) Heart rate for the second 5-minute period should approximate the recommended exercise heart rate, according to one's age. The remaining 5-10 minutes of cardiovascular exercise should not exceed the recommended exercise heart rate.

6) One's maximum heart rate can be determined by counting the heart rate immediately at the end of the exercise period and should be taken while sitting on the bicycle.

7) The 2-minute recovery heart rate should be taken in a standing position after dismounting from the bicycle. However, do not stand still; the blood has a tendency to pool in the legs, which may cause dizziness. To avoid this condition, walk around or walk in place while waiting for the 2 minutes and the second recovery pulse count.

8) Make a permanent record of the maximum and the 2-minute heart rate counts.

4. Intermediate fitness - 3-6 months

a. Musculoskeletal section

(1) Stretching Exercise - 5 minutes

Use exercises a through d. (See Beginning Fitness Level.) Same number of repetitions.

(2) Muscle Strengthening Exercise - 10 minutes

Use exercises a through e. Intensity of exercise may be increased by speeding up the tempo or, as indicated, using the buddy system.

b. Cardiovascular section

(1) Exercise to improve heart and lung function - 21 minutes total time

(2) Use exercises (1) through (4). Choose one, vary choice from time to time, or alternate exercise for the different work periods.

Exercise 1 minute - Rest 1 minute
Exercise 1 minute - Rest 1 minute
Exercise 2 minutes- Rest 1 minute
Exercise 3 minutes- Rest 1 minute
Exercise 4 minutes- Rest 1 minute
Exercise 5 minutes- STOP

NOTE: Check pulse rate during rest period. Adjust intensity to control heart rate at age-adjusted level.

(3) Count heart rate at the end of this exercise period. (10-second count times 6)

(4) Keep heart rate at age level.

(5) Count heart rate (10-second count times 6) at 2 minutes following the end of the longest exercise period.

5. Maintenance fitness - 6 months plus

   a. Musculoskeletal section

      (1) Stretching Exercise - 5 minutes

      Use exercises a through d - same as Intermediate Level.

      (2) Muscular Strengthening Exercises - 10 minutes

      Use exercise a through e - same as Intermediate Level.

   b. Cardiovascular section

      (1) Exercise to improve heart and lung function

      Use exercises 1 through 4. Choose one, or use a combination of several. Vary choice from time to time.

      (2) Warm-up - 5 minutes

      Alternate exercise with rest periods for at least 5 minutes, or start a continuous exercise at a slow pace.

      (3) Conditioning - 20-30 minutes

      This conditioning requires continuous exercise for at least 20 minutes.

      Keep the heart rate appropriate for age.

      Take the heart rate at the end of the longest, continuous exercise period and at two minutes following this exercise period.

      (4) Record as the highest heart rate and 2-minute recovery heart rate for that exercise period.

EXERCISES

PHYSICAL PERFORMANCE

The student will participate in the job-related program described in the POST Basic Academy Physical Conditioning Manual and will demonstrate acceptable physical readiness by successfully completing one of the following tests at the conclusion of the physical conditioning program.

A. The POST job-related work sample test battery
B. A POST-approved job-related test

Performance Objective 12.10.1

CURRICULUM

A. Refer to the *POST Basic Academy Physical Conditioning Manual* for information specific to this performance objective.

SUPPORTING MATERIAL

AND

REFERENCES

This section is set up as reference information for use by training institutions. These materials can be used for instruction, remedition, additional reading, viewing, or for planning local blocks of instruction. This list is not an endorsement of any author, publisher, producer, or presentation. Each training institution should establish its own list of reference materials.

TOPICAL LIST OF SUPPORTING MATERIALS AND REFERENCES INCLUDED IN THIS SECTION

Vegetarian Guide

Nutrition Component

Computing the Target Zone Pulse Rate

Female and Male Scale

Formula for Calculating Ideal Body Weight

VEGETARIAN GUIDE

With the concern over feeding starving nations and saving world resources, one alternative eating plan comes quickly to mind. Pound for pound it is cheaper to feed nations if we rely less on red meats and turn to alternative sources of protein. For example:

1. Sixteen pounds of grain and/or soy feed are required to produce one pound of beef.

2. Six pounds of grain and/or soy feed are needed to produce one pound of pork.

3. Three pounds of feed are required to produce one pound of eggs or poultry.

4. No grain or soy feed (just sun, water, fertilizer, and care) is required to produce one pound of soybeans.

However, does one get adequate nutrition from these alternative sources of protein and vitamins? If done correctly and supplemented with some of the less taxing meats (i.e., poultry and fish) during times of growth (including pregnancy and lactation), vegetarianism can be a healthy way of life. As a class, vegetarians have:

- Lower levels of serum cholesterol in their blood (high serum cholesterol has been connected with heart disease)

- Fewer occurrences of osteoporosis

- A greater capacity for physical endurance

- As a group, a lower incidence of heart disease. And, even if one does not want to be a strict vegetarian, adding a few vegetarian meals per week can be a healthy and inexpensive way to add variety to an eating plan.

How does one go about planning a vegetarian eating plan? The first thing that must be discussed is protein. Protein is an absolute requirement for growth and repair. However, the average adult consumes well above the RDA for protein. The protein from animal products (such as meat, milk, and eggs) is easily absorbed by the body. Plant sources are limited in one or more amino acids, the building blocks of protein.

It has been shown in studies that without all of the essential amino acids present simultaneously, the processing of proteins will be incomplete, and growth will be inhibited.

How does one resolve this problem? By complementing proteins. In other words, by combining vegetable sources in specific ways in a single meal so that the usable protein of that meal will greatly increase to the point at which it supplies all the essential amino acids for protein synthesis.

If one uses some of the recipes for ethnic meals that have been around for centuries without any adverse effect, one can have a very smart eating plan.

HOW TO COMBINE PROTEIN SOURCES:

Group 1	
1. Legumes (beans, peas and lentils), plus: Grains (corn, wheat, brown rice)--look for whole grains.	Beans and Tortillas Lentil Soup and Cornbread Baked Beans and Brown Bread Beans and Rice
Group 2	
2. Grains, plus Milk, Cheese, and Eggs	Pasta and Cheese Pizza Oatmeal and Milk
Group 3	
3. Legumes, plus Seeds (sesame, sunflower) or Cheese and Eggs	Tahini and Hummis (sesame)/Garbanzos Beans and Cheese Beans and Eggs
Group 4	
4. Leafy Green Vegetables plus Seeds or Cheese and Eggs	Broccoli and Sunflower Seeds Broccoli with Cheese Sauce Spinach souffle

Even if a vegetarian combines proteins at two or more meals, he/she must be extra careful because iron, zinc, and possibly other trace elements are not well absorbed from vegetable sources. Plus, it may be hard to get adequate amounts of calcium and iron if one intends to follow a strict "vegan" 1/ diet.

Another problem with the vegetarian diet is that it is very hard to use in times of quick growth (children, adolescents, pregnancy and lactation). Small amounts of meat (fish and poultry) versus pounds of broccoli to get the same amount of protein during these times of "greater need" are advised. And when these times of "greater need" are over, one can resume a healthy vegetarian eating plan.

1/ A vegan is a vegetarian who consumes no animal foodstuffs, not even milk or eggs, as opposed to a lacto-ovo, who consumes milk and eggs but no other animal products.

NUTRITION COMPONENT

I. Three Primary Nutrient Needs

A. Protein: Substances in food (amino acids) from which cells recreate themselves (mitosis)

1. Twenty-two biologically active amino acids are found in human beings.

2. Eight of these are not manufactured by cells and must be consumed in the diet; thus they are called the essential eight amino acids.

a. All eight essential amino acids must be balanced or in relatively equal proportion to each other.

b. Animal sources are generally superior to vegetable sources for this reason, plus the higher protein density per ounce of food.

(1) Vegetable protein sources must be combined to derive a balance of all eight essential amino acids (e.g., legumes and rice, legumes and corn, etc.).

(2) To obtain the same grams of protein found in 4 ounces of white chicken or fish, approximately 2 1/2 cups of boiled beans (legumes) and one 2-ounce serving of cornbread (grain) at a calorie cost of 750 calories (compared to approximately 200 calories per 4 ounces of white chicken or fish).

3. The average adult human being can only absorb and use approximately 30 grams of protein at one sitting. Any excess is converted to fuel (glucose) or blood lipid (triglyceride) by the liver.

a. Four ounces of animal tissue (i.e., poultry, fish, or beef) provide an average of 30 grams of protein.

b. As a rule of thumb: Picture a deck of playing cards for the proper (4 ounce) serving.

4. Different sources of animal food vary greatly in saturated fats, protein, and calories per serving, as shown below:

Sources	Protein	Fat	Calories
4 oz. beef (lean)	29 grams	37 Grams	387
4 oz. chicken (white)	36	21	275
4 oz. fish (white)	36	17	250
1 cup beans (dried/boiled)	11	Trace	220
8 oz. whole milk	9	9	180
1 oz. cheddar cheese	6	10	115
2 eggs (fried)	6	10	115

5. Human beings need approximately 1/2 to 1 gram of protein per kilogram of body weight (2.2 pounds per kilogram)

a. Example: 170-pound-man 85 kilograms @ 1 gram per kilogram. 85 (only 85 grams of protein each day)

b. Since the body can absorb only approximately 30 grams at one time, one serving of white fish (4 ounces) at lunch and one serving (4 ounces) of white chicken at dinner accompanied by one cup of rice would equal 83 grams of protein effectively ingested.

6. The average American grossly overconsumes animal source protein foods (and ingests 1-1 1/2 cups of saturated animal fat each day in the process . . . approximately 40 gallons per capita per year). The typical daily American diet is as follows:

		Protein	Fat
Breakfast	2-3 Eggs (fried)	42	24
	4 oz. Sausage	20	44
Lunch	4 oz. Beef Patty	28	23
	1 oz. Cheese	6	10
	10 oz. Milk	12	12
Dinner	12 oz. Steak	80	108
	3 Tbsp. Sour Cream	trace	18
	3 Tbsp. Butter	trace	36
	TOTAL	188 gm*	275 gm*

*These figures do NOT include (1) potatoes fried in butter; (2) lard commonly served with breakfast and lunch; and (3) butter and mayonnaise liberally spread on the toast or bun served with these dishes.

Note: 1 cup of nonfat yogurt or milk and 2 deck of cards size servings of white poultry or fish should meet the protein needs per day of almost everyone without a lot of saturated animal fat.

B. Carbohydrates. Carbon and water (hydrated carbon CH_2O) commonly termed sugars, from which cells quickly obtain (high heat) energy. The two basic categories of carbohydrates are simple and complex.

1. Simple: Generally removed from original plant tissues (e.g., table sugar, fruit juice, honey, etc.).

a. Absorbed too quickly through digestive tract . . . blood sugar levels rise quickly, which stimulates pancreatic secretion of the hormone Insulin.

(1) Insulin is an indiscriminate hormone: all residual blood sugar (glucose) converted by the liver and stored as liver glycogen or released into the blood as

serum triglycerides. (Blood fats - not immediately available to cells for energy)

(2) Hypoglycemia, or low blood sugar, results within 15-20 minutes, and more sugar is craved.

b. Since sugar is removed from cellulose plant tissue (pulp or fiber) before eating, no digestive fiber is consumed; it must be artificially acquired via bran (wheat husks, etc.).

2. Complex: Generally sugars still held within original plant tissues (e.g., brown rice, baked potatoes, apples, asparagus, etc.).

   a. Digestive enzymes must break through fibrous plant tissue to extract sugars.

      (1) Results in a slow, steady, "trickle" of fuel/energy in usable amounts over 2 1/2 to 3 1/2 hours, with no significant pancreatic stimulation of insulin secretion.

      (2) Once the nutrient load is removed and absorbed by the digestive enzymes, the empty plant fiber pulp is left to serve as digestive fiber, derived as a by-product of normal eating without having to consume nutrient-poor fiber (e.g., bran, psyllium husks, etc.).

   b. Complex sugars should provide 60%-65% of the total daily calorie intake (e.g., whole fresh plant tissues and grains).

      (1) Remember, two whole pieces of fruit, one baked potato or one cup of grain, and two cups of whole fresh vegetables each day should meet this daily nutrient requirement.

C. FAT: Calorie dense molecules composed of carbon, hydrogen, and oxygen (like carbohydrates but a much higher concentration of hydrogen) that are much lighter and compact energy sources than sugars, which are watery. The essential elements in the formation of tissue cell membranes, neural insulation, and hormones.

   1. Three essential fatty acids are required in the diet to support the synthesis of the above substances.

      a. Saturated versus unsaturated and polyunsaturated fats

         (1) Saturated fats contain more hydrogen (usually derived from animals)

         (2) Unsaturated fats contain less hydrogen than saturated fats but more than polyunsaturated fats.

         (3) Polyunsaturated fats contain the least hydrogen (usually derived from plants)

      b. Polyunsaturated and unsaturated fats predominately occur in vegetable tissues; are liquid at room temperature (e.g., corn oil, olive oil, etc.); and contain trace elements or no cholesterol (the serum fat/alcohol molecule associated with hardening of arterial walls and heart disease).

         (1) Saturated fats predominately occur in animal tissues and their secretions (e.g., milk, eggs, etc.) are solid at room temperature (e.g., lard, butter, etc.) and are generally very high in cholesterol.

         (2) Obviously, one should try to derive most of his/her fat needs from vegetable fats (liquid @ room temperature):

            (a) 1 tsp. pure vegetable oil
            (b) 1 oz. roasted or raw nuts
            (c) 1 cup grains

         (3) If one does consume animal fats (e.g., milk, cheese, yogurt), he/she should use nonfat sources.

2. The per capita American consumption of saturated fats is estimated by the American Heart Association at 1-1 1/2 cups per day.

   a. This consumption totals approximately 42 gallons per year (picture a large 42-gallon steel barrel full of lard).

   b. The combination of low-fiber/simple sugar and high-saturated fat in the average American diet has been cited as the primary cause of the rising incidence of stroke, heart attack, and cancer of the colon. (American Heart & Cancer Association)

II. Two Secondary Nutrient Needs:

A. Minerals and Vitamins

1. Vitamins are organic compounds that allow specific metabolic functions to occur in body cells:

   a. Discovered through studying deficiencies (e.g., scurvy - vitamin C; night blindness - vitamin A)

   b. Two chemical groups - Fat soluble and water soluble (substances in which the vitamin can be dissolved and stored)

      (1) Fat Soluble - A, E, D and K (CH & O_2)

         (a) Can be stored in fat tissues
         (b) Can become <u>toxic</u> if overconsumed
         (c) Does not need to be consumed daily
         (d) Properties:

            A = Vision, growth
            D = Bone calcification
            E = Unclear; stamina and possibly prevents anemia
            K = Blood clotting, energy metabolism in cells

         (e) Sources: Yellow vegetables (corn, carrots), milk, eggs, oily grains, nuts, and meats

      (2) Water Soluble - C and B complex

         (a) Cannot be stored

         (b) Must be replaced daily (in some cases more than once a day, because of stress - physical or emotional)

         (c) Overconsumption expelled via the urine but can impair utilization of other nutrients (e.g., C vs. iron and elevated serum uric acid - gout)

         (d) Properties:

            C = Collagen formation, connective tissues, healing of wounds

B = Complex utilization of nutrients by cells (especially muscle), formation of RNA/DNA and blood cells

(e) Sources: Citrus fruits, fresh leafy green vegetables, dried beans, red meat, grains

c. A balanced diet will provide more than ample vitamins for most people (overconsumption of fat solubles A and E can produce toxic side effects: nausea, headache, hair loss and brittle bones). The overconsumption of water soluble B Complex and C can impair utilization of other nutrients (iron) and cause them to be expelled in the urine.

2. Minerals - Twenty-two metallic elements and salts that are essential components of enzymes, hormones, bones, and red blood cells. Regulate subcellular functions and flow of intercellular fluids.

a. Iodine is stored daily in the thyroid and is an important element in the hormone thyroxine, which regulates energy use in cells. Deficiency results in goiter.

b. Iron combines with protein to form hemoglobin in red blood cells (carries oxygen to working muscle cells; a deficiency results in iron deficiency anemia, (obviously critical in endurance sports like distance running and development of obesity).

c. Calcium and phosphorus combine to form bones and teeth; a shortage of calcium in relation to high sodium consumption has been shown to be a key element in high blood pressure; insufficient calcium is also the main factor in the development of osteoporosis, accelerated bone loss in women; phosphorus, the key element in cellular use of energy (combines with the amino acids adenosine to form adenosine triphosphate [ATP] and creatine to form cretin phosphate CP, both essential to the use of sugar glycogen by muscle cells.

d. Magnesium is essential to the breakdown of glucose (blood sugar) to glycogen (muscle sugar).

e. Sodium, chlorine, potassium (salts) - Electrolytes -positively and negatively charged ions that regulate rate of fluid exchange into and out of cells; e.g.:

(1) As a muscle cell works, it requires nutrients and produces waste that must be removed.

(2) Sweat results in substantial losses of the electrolytes; the impaired inflow of nutrients and outflow of wastes produce heat cramps in muscles and, in extreme cases, erythemic heart failure and death.

f. In most cases more than ample minerals are absorbed within the balanced diet above. Possible exceptions would be in the case of women (who have statistically demonstrated tendency toward iron deficiency and calcium deficiency anemia and osteoporosis) who may choose to supplement their diets with these minerals if they feel their diets do not supply adequate amounts.

SUMMARY

Human beings have three primary nutrient needs (protein, carbohydrate, fats) and two secondary nutrient needs (vitamins and minerals). Of the primary nutrients, protein needs are met by two deck of cards (4 oz.) size portions of white meat and one cup of nonfat yogurt or milk; carbohydrate needs

are met by two whole fresh pieces of fruit, two cups of whole fresh vegetables, and one cup of whole grains or dried beans; fat needs are met by polyunsaturated fats contained in the one cup portion of grains or dried beans consumed and vegetable oils (2 Tbsp.) consumed on salads.

The secondary nutrient needs (fiber, vitamins, and minerals) are generally met by consuming the primary nutrients from a variety of whole fresh foods in the manner listed above, which spares the expense of purchasing supplements.

NOTE: Again, women may want to supplement their whole fresh food diet with iron and calcium.

COMPUTING THE TARGET ZONE PULSE RATE

Shown below is one method for computing the target zone pulse rate. The example given is for a person who is 35 years of age and has a resting pulse rate of 70.

	Method	Example
Step 1:	Subtract the individual's age from 220.	220 - 35 equals 185
Step 2:	Subtract the individual's resting pulse rate.	185 - 70 equals 115
Step 3:	Multiply the remainder by 60% Multiply the remainder again by 70%	115 X 60% equals 69 115 X 70% equals 81 (rounded to nearest whole number)
Step 4:	To each number resulting from Step 3 above add the individual's resting pulse rate. The range between these two sums is the individual's target zone for exercising.	69 plus 70 equals 139 81 plus 70 equals 151

The target zone is 139 to 151 beats per minute.

The resting pulse rate should be measured by taking a 60-second count before sitting up or getting out of bed in the morning. The pulse rate can be taken by palpating (with two fingers) the chest directly over the heart or palpating the wrist near the thumb side. The percentages entered into the formula in Step 3 above depend on how much training one has had recently. The following initial target zones are recommended:

Over 30 years old, beginning exercise	60%-70%
Under 30 years old, beginning exercise	70%-80%
Regular aerobic exercise, more than two months	75%-85%
Regular aerobic exercise, more than two years	80%-90%

To monitor pulse rate during exercise, it is best to use a 10-second count. A count for 10 seconds, if taken immediately after exercise, is a more accurate predictor of the pulse rate during exercise than a longer count because the heart slows down immediately after stopping exercise. The 10-second count should be multiplied by six so it can be compared to the target zone pulse rates. For example, a 10-second count of 24 multiplied by 6 is 144 beats per minute.

1.5-Mile Run Test -
Time (Minutes)

FEMALE AND MALE SCALE

Fitness Category		Age, years 13-19	20-29	30-39	40-49	50-59	60+
I. Very poor	(men)	>15:31*	>16:01	>16:31	>17:31	>19:01	>20:01
	(women)	>18:31	>19:01	>19:31	>15:36	>20:31	>21:01
II. Poor	(men)	12:11-15:30	14:01-16:00	14:44-16:30	15:36-17:30	17:01-19:00	19:01-20:00
	(women)	16:55-18:30	18:31-19:00	19:01-19:30	19:31-20:00	20:01-20:30	21:00-21:31
III. Fair	(men)	10:49-12:10	12:01-14:00	12:31-14:45	13:01-15:35	14:31-17:00	16:16-19:00
	(women)	14:31-16:54	15:55-18:30	16:31-19:00	17:31-19:30	19:01-20:00	19:31-20:30
IV. Good	(men)	9:41-10:48	10:46-12:00	11:01-12:30	11:31-13:00	12:31-14:30	14:00-16:15
	(women)	12:30-14:30	13:31-15:54	14:31-16:30	15:56-17:30	16:31-19:00	17:31-19:30
V. Excellent	(men)	8:37- 9:40	9:45-10:45	10:00-11:00	10:30-11:30	11:00-12:30	11:15-13:59
	(women)	11:50-12:29	12:30-13:40	13:00-14:30	13:45-15:55	14:30-16:30	16:30-17:30
VI. Superior	(men)	<8:37	<9:45	<10:00	<10:30	<11:00	<11:15
	(women)	<11:50	<12:30	<13:00	<13:45	<14:30	<16:30

< means "less than"; >means "more than."

FORMULA FOR CALCULATING IDEAL BODY WEIGHT

The Behnke method uses simple tape measurements to calculate how much the adult body should weigh. Find the average circumference of the wrists, forearms, calves, and ankles.

Wrists - Smallest circumference

Left____cm
+ Right____cm

Sum_____ / 2 = Average = _____

Forearms - Largest circumference

Left____cm
+ Right____cm

Sum_____ / 2 = Average = _____

Calves - Largest circumference

Left____cm
+ Right____cm

Sum_____ / 2 = Average = _____

Ankles - Largest circumference

Left____cm
+ Right____cm

Sum_____ / 2 = Average = _____

Men: Sum. Av. Girths/17.07
or (Sum. Av. Girths) (0.0586)

Women: Sum. Av. Girths/16.89
or (Sum. Av. Girths) (0.0592)

Height - Barefoot: 1 in. = 2.54 cm

Total of averages_____ = (_____)2

Squared sum _____

x height _____dm (deci-meter)

Multiply the squared sum by the height. Multiply that total by 0.111 to get the ideal weight in kilograms. Multiply by 2.2 to convert to pounds

Total _____

x 0.111

Ideal weight _____kg

x 2.2

Actual Weight_____lb.

Ideal Weight_____lb.

Ideal weight _____kg

Difference_____lb.

ADDITIONAL REFERENCES

None included