

**Nutrition
and Fitness**

In addition to exercise, proper nutrition plays a major role in attaining and maintaining total fitness. Good dietary habits (see Figure 6-1) greatly enhance the ability of soldiers to perform at their maximum potential. A good diet alone, however, will not make up for poor health and exercise habits. This chapter gives basic nutritional guidance for enhancing physical performance. Soldiers must know and follow the basic nutrition principles if they hope to maintain weight control as well as achieve maximum physical fitness, good health, and mental alertness.

Guidelines for Healthy Eating

Eating a variety of foods and maintaining an energy balance are basic guidelines for a healthy diet. Good nutrition is not complicated for those

who understand these dietary guidelines.

To be properly nourished, soldiers should regularly eat a wide variety of foods from the major food groups, selecting a variety of foods from within each group. (See Figure 6-2.) A well-balanced diet provides all the nutrients needed to keep one healthy.

Most healthy adults do not need vitamin or mineral supplements if they eat a proper variety of foods. There are no known advantages in consuming excessive amounts of any nutrient, and there may be risks in doing so.

For soldiers to get enough fuel from the food they eat and to obtain the variety of foods needed for nutrient balance, they should eat three meals a day. Even snacking between meals can contribute to good nutrition if the right foods are eaten.

Another dietary guideline is to consume enough calories to meet one's energy needs. Weight is maintained as long as the body is in energy balance,

DIETARY GUIDELINES

- **Eat a Variety of Foods**
- **Maintain a Healthy Body Weight**
- **Choose a Diet Low in Fat, Saturated Fat, and Cholesterol**
- **Choose a Diet with Plenty of Vegetables, Fruits, and Grain Products**
- **Use Sugars Only in Moderation**
- **Use Salt and Sodium Only in Moderation**
- **If you Drink Alcoholic Beverages, Do So in Moderation**

Figure 6-1

DAILY FOOD GUIDE		
Eat a variety of foods from each food group. Most people should have the minimum number of servings; others need more due to their body size and activity level.		
FOOD GROUP	SUGGESTED NUMBER OF SERVINGS	SUGGESTED SIZE OF SERVINGS
Vegetables (Include dark green, leafy, or deep yellow ones)	3 to 5	1 cup of raw, leafy greens or 1/2 cup of cooked vegetables
Fruits (Include citrus fruits or juices, melons, or berries)	2 to 4	1 medium fruit or 1/2 cup of diced or small fruit or 3/4 cup of juice
Breads, Cereals, Rice, and Pasta (Include whole grain varieties)	6 to 11	1 slice of bread, 1/2 bun or roll, 1/2 cup of cooked cereal, rice or pasta, 1 oz. of ready-to-eat cereal
Milk, Yogurt, and Cheese (Include skim or lowfat varieties)	2 to 3	1 cup of milk or yogurt, 1-1/2 oz. of hard cheese
Meats, Poultry, Fish, Dry Beans or Peas, Eggs, Nuts (Use lean meats and remove skin from poultry)	2 to 3	2 or 3 oz. of cooked meat, fish, or poultry (TOTAL 6 oz./day) 2 eggs, or 1 cup of cooked beans or peas

Figure 6-2

that is, when the number of calories used equals the number of calories consumed.

The most accurate way to control caloric intake is to control the size of food portions and thus the total amount of food ingested. One can use standard household measuring utensils and a small kitchen scale to measure portions of foods and beverages. Keeping a daily record of all foods eaten and physical activity done is also helpful.

Figure 6-3 shows the number of calories burned during exercise periods of different types, intensities, and durations. For example, while participating in archery, a person will burn 0.034 calories per pound per minute. Thus, a 150-pound person would burn 5.1 calories per minute (150 lbs. x 0.034 calories/minute/lb. = 5.1 calories/minute) or about 305 calories/hour, as

shown in Figure 6-4. Similarly, a person running at 6 miles per hour (MPH) will burn 0.079 cal./min./lb. and a typical, 150-pound male will burn 11.85 calories/minute (150 lbs. x 0.079 cal./lb./min. = 11.85) or about 710 calories in one hour, as shown in Figure 6-3.

To estimate the number of calories you use in normal daily activity, multiply your body weight by 13 if you are sedentary, 14 if somewhat active, and 15 if moderately active. The result is a rough estimate of the number of calories you need to maintain your present body weight. You will need still more calories if you are more than moderately active. By comparing caloric intake with caloric expenditure, the state of energy balance (positive, balanced, or negative) can be determined.

CALORIC EXPENDITURE CHART

ACTIVITY	CAL/MIN/LB	CAL/HR/150 LB	ACTIVITY	CAL/MIN/LB	CAL/HR/150 LB *
Archery	.034	305	Judo, Karate	.087	785
Badminton:			Motor Boating	.016	145
Moderate	.039	350	Mountain Climbing	.086	775
Vigorous	.065	585	Rowing		
Basketball:			(Rec 2.5 MPH)	.036	325
Moderate	.047	420	Vigorous	.118	1000
Vigorous	.066	595	Running:		
Baseball:			6 MPH (10 min/mi)	.079	710
Infield-outfield	.031	280	10 MPH (6 min/mi)	.1	900
Pitching	.039	350	12 MPH (5 min/mi)	.13	1170
Bicycling:			Sailing	.02	180
Slow (5 MPH)	.025	225	Skating:		
Moderate (10 MPH)	.05	450	Moderate (Rec)	.036	325
Fast (13 MPH)	.072	650	Vigorous	.064	575
Bowling	.028	255	Skiing (Snow):		
Calisthenics:			Downhill	.059	530
General	.045	405	Level (5 MPH)	.078	700
Canoeing:			Soccer	.06	570
2.5 MPH	.023	210	Squash	.07	630
4.0 MPH	.047	420	Stationary Run:		
Dancing:			70-80 cts/min	.078	705
Slow	.029	260	Strength Training		
Moderate	.045	405	(10 rep circuit)		
Fast	.064	575	60% 1RM	.022	198
Fencing:			80% 1RM	.048	432
Moderate	.033	300	Swimming (crawl):		
Vigorous	.057	515	20 yds/min	.032	290
Fishing	.016	145	45 yds/min	.058	520
Football (tag)	.04	360	50 yds/min	.071	640
Gardening	.024	220	Table Tennis:		
Gardening-Weeding	.039	260	Moderate	.026	235
Golf	.029	260	Vigorous	.06	540
Gymnastics:			Tennis:		
Light	.022	200	Moderate	.046	415
Heavy	.056	505	Vigorous	.04	540
Handball	.063	570	Volleyball:		
Hiking	.042	375	Moderate	.036	325
Hill Climbing	.06	540	Vigorous	.065	585
Hoeing, Raking,			Walking:		
Planting	.031	280	2.0 MPH	.022	200
Horseback Riding:			3.0 MPH	.03	270
Walk	.019	175	4.0 MPH	.039	350
Trot	.046	415	5.0 MPH	.064	575
Gallop	.067	600	Water Skiing	.053	480
Jogging:			Wrestling	.091	820
4.5 MPH (13:30 mi.)	.063	565			

* A 150-pound person will expend the number of calories indicated in one hour for any given activity.

Figure 6-3

Avoiding an excessive intake of fats is an important fundamental of nutrition.

Carbohydrates are the primary fuel source for muscles during short-term, high-intensity activities.

Avoiding an excessive intake of fats is another fundamental dietary guideline. A high intake of fats, especially saturated fats and cholesterol, has been associated with high levels of blood cholesterol.

The blood cholesterol level in most Americans is too high. Blood cholesterol levels can be lowered by reducing both body fat and the amount of fat in the diet. Lowering elevated blood cholesterol levels reduces the risk of developing coronary artery disease (CAD) and of having a heart attack. CAD, a slow, progressive disease, results from the clogging of blood vessels in the heart. Good dietary habits help reduce the likelihood of developing CAD.

It is recommended that all persons over the age of two should reduce their fat intake to 30 percent or less of their total caloric intake. The current national average is 38 percent. In addition, we should reduce our intake of saturated fat to less than 10 percent of the total calories consumed. We should increase our intake of polyunsaturated fat, but to no more than 10 percent of our total calories. Finally, we should reduce our daily cholesterol intake to 300 milligrams or less. Figure 6-4 suggests actions commanders can take to support sound dietary guidelines. Most of these actions concern dining-facility management.

Concerns for Optimal Physical Performance

Carbohydrates, in the form of glycogen (a complex sugar), are the primary fuel source for muscles during short-term, high-intensity activities. Repetitive, vigorous activity can use up most of the carbohydrate stores in the exercised muscles.

The body uses fat to help provide energy for extended activities such as a one-hour run. Initially, the chief fuel burned is carbohydrates, 'but as the duration increases, the contribution from fat gradually increases.

The intensity of the exercise also influences whether fats or carbohydrates are used to provide energy. Very intense activities use more carbohydrates. Examples include weight training and the APFT sit-up and push-up events.

Eating foods rich in carbohydrates helps maintain adequate muscle-glycogen reserves while sparing amino acids (critical building-blocks needed for building proteins). At least 50 percent of the calories in the diet should come from carbohydrates. Individual caloric requirements vary, depending on body size, sex, age, and training mission. Foods rich in complex carbohydrates (for example, pasta, rice, whole wheat bread, potatoes) are the best sources of energy for active soldiers.

COMMANDER'S CHECKLIST FOR NUTRITION

PRINCIPLES OF NUTRITION

1. Eat a variety of foods.
No single food item provides all essential nutrients.

2. Maintain a desirable body weight.
Excess body fat detracts from fitness. Weight loss is achieved by increasing physical activity and decreasing total food intake, especially fats, refined sugars, and alcohol.

3. Avoid excess dietary fat.
Too much fat (especially cholesterol and saturated fat) can lead to heart disease and weight problems. Fats contain twice as many calories as equal amounts of carbohydrates or protein.

4. Avoid too much sugar.
Sweets are empty calories and may lead to dental cavities and weight problems.

5. Eat foods with adequate starch and fiber.
Eating complex carbohydrates adds to the diet and reduces symptoms of constipation.

6. Avoid too much sodium.
Eating highly-salted foods may lead to excessive sodium intake. This may be a problem for those "at risk" for high blood pressure.

7. If you drink alcoholic beverages, do so in moderation.
Alcoholic beverages are high in calories and low in nutrients. One or two standard-size drinks daily appears to cause no harm in normal, healthy, nonpregnant adults.

8. Know the nutrition principles.
Educating soldiers maximizes efforts to improve nutritional fitness.

Reference: AR 30-1, Appendix J.

SUPPORTING ACTIONS

In the dining facility:

- Ensure menus provide foods from the basic 4 food groups: fruits and vegetables, meats, dairy products, and breads and cereals.
- Establish serving lines in the following order, if possible:
(1) salads, (2) fruits, (3) entrees, (4) hot vegetables, (5) breads, (6) beverages, (7) desserts.

In the dining facility, provide:

- Low-calorie menu, including short-order items at each meal. Use the Master Menu (SB 10-260) menu patterns.
- Reduced-portion sizes.
- No-calorie beverages.
- Low-calorie salad dressings.
- Posted list of caloric values of menu items, before or on the serving line.

In the dining facility, provide:

- Non-fried eggs as an alternative.
- Margarine as a butter alternative.
- Two percent milk as the primary milk in bulk dispensers.
- Skim milk in 1/2-pint cartons.
- Sauces, gravies, and margarine separately from the entree or vegetable.
- Avoid animal fats, palm oil, and hydrogenated vegetable oil.

In the dining facility, provide:

- Fruit as a dessert alternative.
- Unsweetened juices.
- No-calorie, unsweetened beverages.
- Non-nutritive, sugar substitute as a granulated sugar alternative.
- Unsweetened cereal.

In the dining facility, provide:

- Whole-grain breads, cereals and legumes.
- Fresh fruit.
- Salad bars at lunch and dinner.

- Reduce salt in recipes by 25 percent.

- Avoid alcohol; it is detrimental to good health and weight management.

- Display educational materials on nutrition; (posters, table tents, bulletin boards, and handouts).
- Provide food-service personnel with training programs on nutrition standards.
- Provide unit-training programs on nutrition for soldiers. (Use installation dietitian).

Figure 6-4

Because foods eaten one to three days before an activity provide part of the fuel for that activity, it is important to eat foods every day that are rich in complex carbohydrates. It is also important to avoid simple sugars, such as candy, up to 60 minutes before exercising, because they can lead to low blood sugar levels during exercise.

Soldiers often fail to drink enough water, especially when training in the heat. Water is an essential nutrient that is critical to optimal physical performance. It plays an important role in maintaining normal body temperature. The evaporation of sweat helps cool the body during exercise. As a result, water lost through sweating must be replaced or poor performance, and possibly injury, can result. Sweat consists primarily of water with small quantities of minerals like sodium. Cool, plain water is the best drink to use to replace the fluid lost as sweat. Soldiers should drink water before, during, and after exercise to prevent dehydration and help enhance performance. Figure 6-5 shows recommendations for fluid intake when exercising.

Sports drinks, which are usually simple carbohydrates (sugars) and electrolytes dissolved in water, are helpful under certain circumstances. There is evidence that solutions containing up to 10 percent carbohydrate will enter the blood fast enough to deliver additional glucose to the active muscles. This can improve endurance.

During prolonged periods of exercise (1.5+ hours) at intensities over 50 percent of heart rate reserve, one can benefit from periodically drinking sports drinks with a concentration of 5 to 10 percent carbohydrate. Soldiers on extended road marches can also benefit from drinking these types of glucose-containing beverages. During intense training, these beverages can provide a source of carbohydrate for working muscles. On the other hand, drinks that exceed levels of 10 percent carbohydrate, as do regular soda pops and most fruit juices, can lead to abdominal cramps, nausea, and diarrhea. Therefore, these drinks should be used with caution during intense endurance training and other similar activities.

Many people believe that body builders need large quantities of

RECOMMENDATIONS FOR FLUID INTAKE

- Drink cool (40 degrees F) water. This is the best drink to sustain performance. Fluid also comes from juice, milk, soup, and other beverages.
- Do not drink coffee, tea, and soft drinks even though they provide fluids. The caffeine in them acts as a diuretic which can increase urine production and fluid loss. Avoid alcohol for the same reason.
- Drink large quantities (20 oz.) of water one or two hours before exercise to promote hyperhydration. This allows time for adequate hydration and urination.
- Drink three to six ounces of fluid every 15 to 30 minutes during exercise.
- Replace fluid sweat losses by monitoring pre-and post-exercise body weights. Drink two cups of fluid for every pound of weight lost.

Figure 6-5

protein to promote better muscle growth. The primary functions of protein are to build and repair body tissue and to form enzymes. Protein is believed to contribute little, if any, to the total energy requirement of heavy-resistance exercises. The recommended dietary allowance of protein for adults is 0.8 grams per kilogram of body weight. Most people meet this level when about 15 percent of their daily caloric intake comes from protein. During periods of intense aerobic training, one's need for protein might be somewhat higher (for example, 1.0 to 1.5 grams per kilogram of body weight per day). Weight lifters, who have a high proportion of lean body mass, can easily meet their protein requirement with a well-balanced diet which has 15 to 20 percent of its calories provided by protein. Recent research suggests that weight trainers may need no more protein per kilogram of body weight than average, nonathletic people. Most Americans routinely consume these levels of protein, or more. The body converts protein consumed in excess

of caloric needs to fat and stores it in the body.

Nutrition in the Field

Soldiers in the field must eat enough food to provide them with the energy they need. They must also drink plenty of water or other non-alcoholic beverages. The "meal, ready to eat" (MRE) supplies the needed amount of carbohydrates, protein, fat, vitamins, and minerals. It is a nutritionally adequate ration when all of its components are eaten and adequate amounts of water are consumed. Because the foods are enriched and fortified with vitamins and minerals, each component is a major source of nutrients. Soldiers must eat all the components in order to get the daily military recommended dietary allowances (MRDA) and have an adequate diet in the field. Soldiers who are in weight control programs or who are trying to lose weight can eat part of each MRE item, as recommended by dietitians.