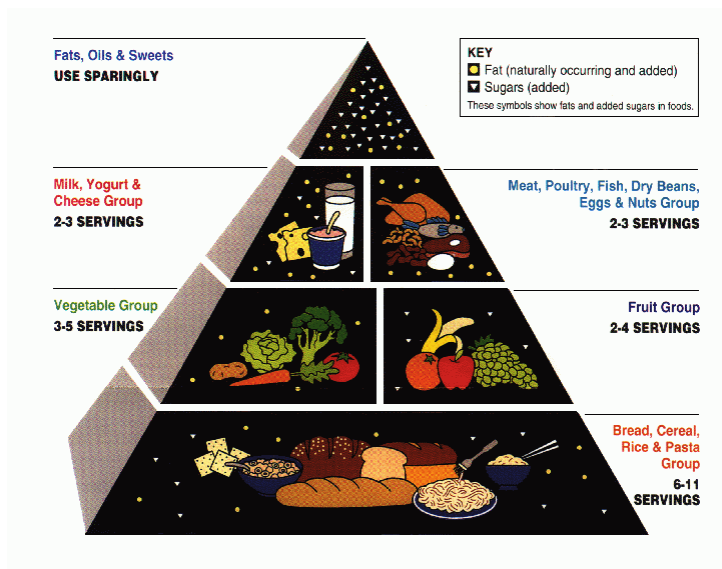


Sports Nutrition

As an athlete, you understand the health benefits of regular exercise. An athlete, at any level, must also pay attention to special nutrition demands for active individuals. This booklet will answer common nutrition questions and guide your choices for a balanced diet.

Food Guidelines for a Balanced Diet

Food Group	Servings per Day
Low Fat Milk and dairy products	2-3 cups
Fruits and vegetables	
Dark green or deep yellow vegetables (vitamin A)	½ cup
Citrus foods (vitamin C)	½ cup
Other fruits, juices	1 cup
Breads, cereals, starches	6-11 servings
Protein: meat, fish, poultry eggs, dried beans or peas	2-3 servings
Fats, oils, sweets	3 servings or less



This food plan provides about 1800 calories and 83 grams of protein. Of these calories, about 52% are from carbohydrates, 18% from proteins and 30% from fats. Teenagers and young adults should add one extra cup of milk to the basic plan.

Remember, this is only a sample food guide. The number of servings may have to be increased or decreased to meet your energy needs. Each person's calorie needs vary because of differences in body size and activity level.

A Basic Nutrition Guide

First, it's important to know what comprises a balanced diet. A well-balanced diet contains a variety of foods daily including:

- Milk and dairy products
- Fruits and vegetables
- Whole or enriched grains, breads and cereals
- Proteins such as meat, fish, poultry, eggs, tofu, dried peas or beans
- Other foods such as fats and sweets can be part of a balanced diet, too.

It's also a good idea to think about nutrition balance from another aspect: balance between carbohydrates, proteins and fats. Nutrition experts suggest 60-65% of your total calories come from carbohydrates (mainly from complex carbohydrates or starches rather from simple sugars), 10-15% from protein and 20-30% from fat (less than 10% saturated fat).

The table on the first page is a guideline for selecting a healthy diet for all people, whether they exercise or not. Notice how the food guide uses variety for a well-balanced meal plan.

Serving Size

Portion sizes are important. This table will help you determine what a "serving" is for each of the food groups.

One dairy serving:

- 1 cup milk
- 1-1/2 oz. cheese
- 1 cup yogurt

One fruit serving:

- 1 medium piece of fruit
- 1/4 c. dried fruit
- 1/2 c. canned fruit
- 3/4 c. fruit juice

One vegetable serving:

- 1/2 c. cooked vegetable
- 3/4 c. vegetable juice
- 1 c. salad

One protein serving:

- 2 eggs
- 1 c. legumes (dried peas or beans)
- 2 oz. cheese
- 2 T. peanut butter
- 1/2 c. tuna
- 1/2 c. cottage cheese
- 2-3 oz. meat, poultry, fish
- 3 oz. tofu
- 3 oz. soy burger

One carbohydrate serving:

- 1 slice bread
- ½ hamburger or hot dog bun
- ½ bagel or English muffin
- ½ c. rice, noodles, peas, potatoes, corn
- 1 oz. cereal
- 3 c. plain popped popcorn
- 5 crackers

One fat serving:

- 1 tsp. butter or margarine
- 1 tsp. mayonnaise or 1 T. reduced fat mayonnaise
- 1 T. salad dressing or 2 T. reduced fat dressing
- 1 T. cream cheese
- 2 T. cream, sour cream or 3 T. reduced fat sour cream
- 1 strip bacon
- 1 T. nuts or seeds

Nutrition for Sports

As an athlete, some of your nutritional needs are different from the basic nutrition guidelines shown earlier. You need to drink more liquid to offset the fluid lost as sweat during exercise. You also need to eat more calories, especially carbohydrate calories, to supply the extra energy that exercise demands.

Your target sports diet should provide 55-70% of your total calories from carbohydrates (or 3-5 grams carbohydrate per pound of body weight). Endurance athletes should aim for the higher end of this range.

Phase I: Training Needs

People involved in athletic training need to increase their fluid and calorie intake.

Fluids—Our thirst mechanism does not effectively signal when and how much fluid is lost during workouts. The best way to measure body fluid losses is to weigh yourself without clothing before and after exercise. For every pound of weight that is lost during exercise, drink three 8-oz. cups of fluid. Drink on a schedule during exercise to prevent thirst. Once you feel thirsty, you are already becoming dehydrated. Avoid caffeine-containing beverages and alcohol, which can promote dehydration.

Calories—Unless you're trying to lose weight, you must eat more food. Extra calories/energy replace those that have been burned during exercise.

The best way to increase calories is by eating more complex carbohydrates. Your body can store carbohydrates as glycogen in muscles and liver; glycogen provides energy during workouts and competition. Even if you do wish to lose weight, avoid eating less than the amounts of food listed in the basic food guide on the inside front cover. Weight loss at a rate of 1 lb. per week or less is best for your health as well as athletic performance.

Carbohydrates—Energy Foods—Carbohydrates provide the main source of energy for our bodies. This is especially true for athletes. Carbohydrate foods can be classified as either simple or complex, depending on their chemical structure.

Complex carbohydrates, often referred to as starches, are branches of several sugar molecules. These carbohydrates are good energy sources for building glycogen stores in your muscles. They are also a good source of vitamins and minerals.

Complex Carbohydrate Foods

- whole grain breads and cereals
- enriched breads and cereals
- bagels, muffins, pancakes, tortillas
- barley, rice, grits, pasta
- crackers, popcorn, pretzels
- legumes (dried beans or peas, lentils)
- vegetables—potatoes, corn, peas, squash

Simple sugars are the most basic form of carbohydrates. These may be natural sugars such as fructose (in fruits) or lactose (in milk). Sugars obtained from natural products may be used to make other forms of sugars (honey, molasses, corn syrup, table sugar, jellies, and jams). Other foods high in sugar content are soda pop (non-diet), fruit drinks, gelatin, and desserts.

The food plan on page 6 will help you develop a training diet. Compare this food plan to the basic food guide shown on the front. The training diet plan is higher in fluid and carbohydrate calories.

“When should I carbohydrate load?”

Carbohydrate or glycogen-loading refers to a diet and exercise procedure which helps muscles store glycogen above normal levels. This is of value only for endurance aerobic competition. An endurance event is continuous activity lasting longer than 90 minutes, for example cross-country skiing or running a marathon.

How to Carbohydrate Load

Super-saturating your muscles with glycogen involves a week-long training schedule and special diet:

Day 1—You should train long and hard, at least 90 minutes or until you have “hit the wall.” This depletes the glycogen in your muscles. It is important to use the same muscles you’ll use during competition.

Days 2 and 3—You should be eating a diet comprised of at least 55% carbohydrates and reduce your workouts to one-third to one-half of your usual effort.

Days 4 and 5—Limit your workout to about 20 minutes. A 70% carbohydrate diet at this time provides the fuel to produce muscle glycogen.

Day 6—Take a rest from training before your event to maximize muscle glycogen storage. Continue to eat a high carbohydrate diet (70% of total calories).

Day 7—Competition

Training Diets

<u>Food Group</u>	<u>Servings per day</u>
Low Fat Milk and dairy products	4 cups
Fruits and vegetables (including those below)	5-9
Dark green or deep yellow vegetables	½ cup
Citrus foods (Vitamin C)	½ cup
Fruits, juices	1-2 cups or less
Breads, cereals, starches	12 servings or more
Protein: meat, fish, poultry, eggs, dried beans or peas	3-4 servings
Fats, oils, and sweets	5 servings or less

This plan provides about 2800 calories: 135 grams of protein, and about 60% of the calories from carbohydrates, 15% from protein, and 25% from fat.

This diet is a sample of the quantity of food that you may need to eat while training. You may need to alter your plan and eat more or less than this. Food choices are also important. If you have trouble eating enough to maintain your weight, try adding between meal snacks.

High Carbohydrate Diet Guide

Breads and cereals (12 or more servings per day)

Choose:

Breads, 1 slice
Dry cereals, 1 cup
Cooked cereals, ½ cup
Rice, boiled, 1/3 cup
Pasta, ½ cup
Pancake, 1 small

Eat less:

Croissants
Granola
Fried rice
Pasta with rich sauces
Waffles

Fruits and Vegetables (5-9 or more servings per day)

Choose:

Starchy vegetables, ½ cup (corn, peas, etc.)
Other vegetables, ½ cup
Vegetable juice, ½ cup
Fruit, medium, whole or ½ cup
Fruit juice, ½ cup
Fruit, dried, 2 tbsp.

Eat less:

Vegetables with rich sauce
Deep fried vegetables
Coleslaw
Coconut

Milk/Milk Alternatives (3 servings for adults, 4 for teens)

Choose:

1%/skim milk or soymilk, 1 cup
Low-fat cheese, 1 oz.
Pudding, low fat, 1 cup
Hot cocoa, low-fat, 1 cup
Low-fat yogurt
Soymilk, 1 cup

Eat less:

2%/whole milk
Regular and processed cheese
Ice cream
Whole milk yogurt
Whipped cream
Sour cream
Milk shakes
Cheesecake

Meat/Meat Alternatives (2 servings per day)

Choose:

Lean meat, fish, shellfish, poultry, 2 oz.
Egg whites, 2
Low-fat cheese, 2 oz.
Dried beans, peas, lentils, 1 cup
Nuts, 1 oz.

Eat less:

Fatty meats
Eggs (in excess of 4 per week)
Peanut butter
Liver
Liverwurst
Hot dogs
Corned beef
Salami
Bologna
Ribs
Sausage
Fried meats
Ground beef

Other foods

Choose:

Hard candy, 6 pieces
Angel food cake, 1 slice
Sherbet, ½ cup
Frozen yogurt, ½ cup
“Lite” salad dressings, margarine,
mayonnaise
Jello, ½ cup
Popcorn, unbuttered, 3 cups

Eat less:

Cake with frosting
Chocolate
Nuts
Excess butter
Margarine
Sour cream
Mayo
Salad dressing
Chips

Sample Menus

High Protein*, High Fat (30% carbohydrate)

12 oz. water
 ½ c. orange juice
 1 slice toast w/2 t. margarine
 1 fried egg
 2 sausage patties

4 oz. burger
 large french fries
 1 med. Apple
 2 oatmeal cookies

4 oz. steak
 ½ baked potato
 1 T. sour cream
 2 pats margarine
 tossed salad
 2 T. dressing
 1 dinner roll w/1 t. margarine

½ c. ice cream

*This diet is very high in fat and protein and is therefore not recommended. It is shown for illustration only.

High Carbohydrate (50%)

12 oz. water
 1 c. orange juice
 2 lg. waffles
 2 T. syrup
 1 c. skim milk
 1 t. margarine
 1 banana

¾ c. granola
 1 c. skim milk
 8 oz. water

1 c. fruit juice
 1 c. spaghetti
 6 oz. sauce (2 oz. lean meat)
 1 T. Parmesan cheese
 1 c. skim milk

16 oz. water
 3 c. buttered popcorn
 1 med. Apple

3 oz. chicken breast
 1 baked potato
 1 c. carrots
 ½ c. fruit salad
 1 c. skim milk
 2 t. margarine

½ c. ice cream
 12 oz. water

Very High Carbohydrate (70%)

12 oz. water
 1 c. orange juice
 2 lg. pancake
 3 T. syrup
 1 c. skim milk
 1 t. margarine
 1 c. hot cocoa

1 c. dry cereal
 1 banana
 1 c. skim milk
 8 oz. water

1 c. fruit juice
 1 c. spaghetti
 6 oz. sauce (2 oz. lean meat)
 2 medium apples
 1 c. green beans
 1 c. skim milk

16 oz. water
 3 c. unbuttered popcorn

3 oz. chicken breast w/o skin
 1 dinner roll
 1 baked potato
 1 c. fruit salad
 1 c. carrots
 1 c. skim milk
 1 t. margarine

2 slices angel food cake
 12 oz. water

Each of these diets provides about 2400 calories. Note the greater amount of food required for a higher carbohydrate diet (carbohydrates are less calorie-dense than fats).

If you have nutrition questions, seek help from a qualified, trained professional, such as a registered dietitian.

Phase II: Pre-event Meals

Athletes often ask what they should eat before an event. The purpose of the pre-event meal is to prevent hunger but avoid feeling full during the event.

When planning a pre-competition meal...

Use the following guidelines for planing your meals:

- Allow 3-4 hours before an event for a large, high-carbohydrate meal (500-1200 calories). Allow 2-3 hours before an event for a small, high carbohydrate meal (200-500 calories). Allow 1-2 hours for a high carbohydrate snack (100-200 calories). This will allow your stomach time to empty. A meal high in complex carbohydrates is best; meals with too much protein and fat leave the stomach slowly.
- Avoid fatty and fried foods.
- If you eat meals that are high in protein, you may become dehydrated during competition because your kidneys require extra water to excrete protein.
- Avoid high fiber, gas-forming foods. These foods may stimulate bowel activity and cause discomfort during activity.
- Some people need to avoid sugars and sweets, including soft drinks, within one hour of an event. For these “sugar sensitive” people, high sugar foods do not give quick energy. In fact, sugary foods may cause a sugar low after exercise begins.
- Drink plenty of fluids with your pre-event meal—16-24 oz. up until 2 hours before starting time. Then drink 8-16 oz. of water 5 to 10 minutes before the event.
- Experiment during training with various foods and portion sizes to determine appropriate types and amounts for you.
- Don't try new foods prior to an important event. Stick with tried and true favorites that you know will be well tolerated.

Phase III: During the Event

Your main concern during competition is dehydration. If you lose water without replacing it, your muscles lose strength and endurance. You need not drink during events lasting less than 30 minutes, if you take enough fluid before and after. But pay attention to fluid replacement during tournaments when you may be involved in activities or multiple events over one or two days. In this situation, replacing fluids and energy (calorie) stores is important.

Activities lasting beyond one-half hour require frequent fluid replacements. Four to eight ounces (½ cup to 1 cup) of water (45-55 degrees F) every 10-15 minutes is suggested. Cool water is absorbed faster, so it's your best choice.

Fluids for Endurance Events

Events lasting 90 minutes or more, such as marathons, may warrant use of sports drinks or diluted juices. Such beverages provide water, carbohydrates, and electrolytes.

Sports drinks contain sodium, potassium and sugar in water. The types of sugar may be glucose, sucrose (table sugar), fructose or maltodextrins (glucose polymers). In a 6-8 % solution, these sugars leave the stomach at about the same rate. While sugar solutions empty from the stomach more slowly than water, they are absorbed more rapidly across the small intestine and into the blood (with the exception of fructose).

The net effect is that small amounts of sodium and sugar increase fluid absorption. Therefore, in an endurance event, dilute sugar and sodium solutions effectively provide water to replace body fluid losses and a source of energy for greater endurance.

However, sports drinks that are formulated for “fluid and energy replacement” are not good electrolyte sources. High sodium or potassium levels are not tolerated well during exercise. Electrolyte replacement should take place after an event by eating a well-balanced meal including high sodium and potassium foods.

Sports Bars

Nothing can take the place of eating a variety of well-chosen, nutritious foods, but sports bars are a convenient snack when you're on the go. Each bar has a unique composition:

- It is important to eat high carbohydrate foods soon after exercise to restore muscle energy stores. Power Bar and Clif Bar are good choices.
- If you need a balanced, between meal snack try Steel Bar or Balance Bar. They are good sources of protein, fat, and carbohydrates.
- The Clif Bar contains free-radical fighting antioxidants, which may enhance recovery after hard workouts.

<u>Types of Bars</u>	<u>Nutrient Content</u>
Power Bar	Total Calories: 230 kcal Total Fat: 2.5 g Saturated Fat: 0.5 g Carbohydrate: 45 g Protein: 10 g
Balance Bar	Total Calories: 190 kcal Total Fat: 6 g Saturated Fat: 3 g Carbohydrate: 22 g Protein: 14 g
Steel Bar	Total Calories: 300 kcal Total Fat: 5 g Saturated Fat: 2.5 g Carbohydrate: 45 g Protein: 10 g

Clif Bar
 Total Calories: 250 kcal
 Total Fat: 2.5 g
 Saturated Fat: 0.5 g
 Carbohydrate: 45 g
 Protein: 10 g

Granola Bar
 (average of several commercial brands)
 Total Calories: 140 kcal
 Total Fat: 4.5 g
 Saturated Fat: 3 g
 Carbohydrate: 27 g
 Protein: 3 g

Fluid Replacement Drinks

A Comparison of Beverages (8 oz. servings)

Beverage	Carb Source	Carb Concentration	Calories	Sodium (mg)	Potassium (mg)
Gatorade	sucrose-syrup, glucose-fructose corn syrup	6%	50	110	30
All-Sport	high fructose corn syrup	8.6%	70	55	50
Power Ade	high fructose corn syrup, maltodextrin	8.6%	70	55	30
Most carbonated sodas	high fructose corn syrup/ sucrose	10.2-11.3%	90-95	10-30	trace
Orange juice	fructose, sucrose, glucose	11.8%	112	2.7	510
Water	--	--	--	trace	trace

Note: Beverages which contain large amounts of fructose (listed as first ingredient) may delay water absorption. Some studies have shown an increase in perceived exertion as well as more bloating/cramping with consumption of high fructose containing beverages. These beverages are not your best choice as a fluid replacement.

If you enjoy the taste of a beverage, you'll usually drink more of it. So be sure to find a replacement drink that you like. Drinks containing glucose, sucrose, and fructose taste sweeter than glucose polymer drinks. It's also important to experiment with a variety of beverages during training so you'll know which ones are best tolerated.

Note: Products such as Gatorlode, MetRx, Ensure and Carnation Instant Breakfast are not formulated for use during activity. These products can be used as supplements to your high carbohydrate diet if you have difficulty maintaining your weight during training. They can also be used as a convenient meal replacement or as a liquid pre-event meal when your schedule is hectic or you don't have access to cooking facilities.

Phase IV: After Training or Competition

After a workout, you need to replace lost fluid and energy (calories). It may take some time to relax and feel like eating solid food after a tough competition. However, fluid and carbohydrate replacement should begin immediately.

Fluids—If you have weighed yourself before and after exercise, drink 3 cups of fluid for each pound of weight lost. Drink until your urine is pale yellow.

Energy—You will often spontaneously choose foods high in calories after an event since you will have burned extra energy during competition.

Carbohydrates—For fastest replacement of muscle glycogen, eat or drink high carbohydrate foods within the first hour after exercise (0.75 grams carbohydrate per pound body weight). If you don't feel hungry for solid foods, drink fruit juices which are high in carbohydrates. Foods with a higher "glycemic index" are most effective at this time (breads, bagels, juices, dry cereal, sugars).

Protein—To help build and repair muscle tissue after exercise, you will need to include protein in your diet (0.5 to 0.75 grams protein per pound of muscle weight).

Electrolytes (sodium and potassium)—Only very small amounts of electrolytes are lost in sweat during a workout shorter than one hour. These small amounts are easily replaced when you eat your next meal.

If your event lasted longer than two hours or you have lost greater than 4-6% of your body weight in water, your electrolyte needs may be slightly higher. Be sure to eat salty foods or add salt to your usual diet. High potassium foods to include in your diet are milk products, fruits, vegetables, and protein foods.

Replacement drinks are formulated for use during exercise and are therefore quite dilute. For this reason, they are not good choices for recovery (they are relatively low in carbohydrates). They are also inappropriate for replacing sodium and potassium should electrolyte depletion become a problem for you.

Myths About Nutrition for Athletes

Myth: Protein and amino acid supplements speed muscle-building and strength.

Fact: While extra protein is needed by athletes, exercise and training are more important for building muscle and increasing strength. Protein in excess of your needs is burned for energy or stored as fat. The “rule of thumb” is 0.5 to 0.75 grams of protein per pound of body weight. Body builders would fall at the lower end of the range and endurance athletes at the higher end (marathon runners end up burning some protein for energy during long workouts so their needs are higher). You also need additional calories from carbohydrates and fat so your body will not burn protein for energy.

Myth: Vitamins help provide energy. Athletes need more vitamins than other people.

Fact: Vitamins do not provide energy. The foods you eat provide energy. Some vitamins may be needed in greater amounts, but can be obtained from a normal, balanced diet as outlined on page 1. If your diet is not well balanced, a regular multiple vitamin with minerals that provides 100% of the RDA will meet your needs. Also, many sport bars and breakfast cereals provide 100% RDA for many vitamins and iron.

Myth: Excess salt and potassium is needed to replace sweat losses after heavy workouts and on hot days.

Fact: The portion of sweat that needs to be replaced is water. With regular exercise, the body will lose less salt and potassium in sweat. For people who sweat a lot (6-15 pounds fluid loss during a given workout), a diet that includes salty foods like pizza, spaghetti sauce, or soup has enough salt. Salt tablets can upset your stomach and can further complicate dehydration. Potassium comes from fresh and dried fruits or vegetables, whole grains, meat, and milk. Avoid sodium or potassium supplements unless prescribed by your doctor or trainer. If blood levels of potassium become too high, injury to the heart or heart attack may result.

Approximate Calorie Costs of Various Activities

<u>Activity</u>	<u>Calories/Minute/Pound</u>
Cycling—5.5 MPH	0.029
--9.4 MPH	0.045
--racing	0.077
Dancing	0.023-0.076
Football	0.060
Golf	0.039
Gymnastics (apparatus)	0.030
Running—6 min. mile	0.115
--9 min. mile	0.088
--cross country	0.074

Skiing, cross country	0.045-0.125
Squash	0.096
Swimming—breaststroke	0.074
--freestyle (55 yards per min.)	0.071
Tennis	0.050
Wrestling	0.023

Example: 150 pound person cycling at 5.5 mph burns 260 calories in 60 minutes.

$$\frac{0.029 \text{ calories}}{\text{pound/minute}} \times 150 \text{ pounds} \times 60 \text{ minutes} = 262 \text{ cal.}$$

From: McArdle, W.D., et al., *Exercise Physiology*, Lea & Febiger, 1986. Pp. 642-650.

Vegetarian Athletes

Unless well planned, meat-free diets tend to be low in calcium, iron and zinc—three minerals that are especially important for athletes. Several good sources of these nutrients are:

Calcium—milk and dairy products, calcium fortified orange juice, pasta or breakfast bars.

Iron—enriched breads, cereals and pasta, legumes, tofu.

Zinc—wheat germ, legumes, nuts, whole grain breads.

If you don't regularly include these foods in your diet, you may not be getting adequate amounts. A registered dietitian can evaluate your diet and help with finding food sources of missing nutrients.

Web Site:

The physician and Sports Medicine on line:

www.physsportsmed.com/personal.htm#nutrition

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*Williams, Melvin. *Nutrition for Health, Fitness & Sport*. McGraw Hill, 2001. ISBN: 0072489413

*Williams, Melvin. *Ergogenics Edge*. Human Kinetics, 1997. ISBN: 0880115459

*These materials provide more advanced information.

If you have more questions please contact UW Health at one of the phone numbers listed below.

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