



# Nutrition for Physical Activity and Athletics

Janice R. Hermann, Ph.D., RD/LD

Nutrition Specialist

Being physically active has many health benefits, and good nutrition plays an important role in physical activity and athletic performance. Whether participating in physical activity for personal fitness or for competition, everyone benefits from a well balanced diet following the USDA Daily Food Plan. The USDA Daily Food Plan encourages eating a variety of foods from the USDA Daily Food Plan food groups.

While the USDA Daily Food Plan provides the foundation for a healthy diet, there are some special dietary considerations for physical activity and athletics. The American Dietetic Association makes the following dietary recommendations for physical activity and athletics.

## Body Weight and Body Fat

Ideal body weight for health or athletic performance varies from person to person. Age, gender, level of physical activity, and family history all affect body weight. The importance of body weight goes beyond looks and physical performance.

For the general population, body fat levels between 18 percent to 21 percent for young men and 23 percent to 26 percent for young women are recommended. Trained athletes may have less body fat, ranging from

Oklahoma Cooperative Extension Fact Sheets  
are also available on our website at:  
<http://osufacts.okstate.edu>

7 percent to 16 percent for men, and 15 percent to 22 percent for women. Body fat below 7 percent for men and 15 percent for women may also increase health risks.

## Weight Management

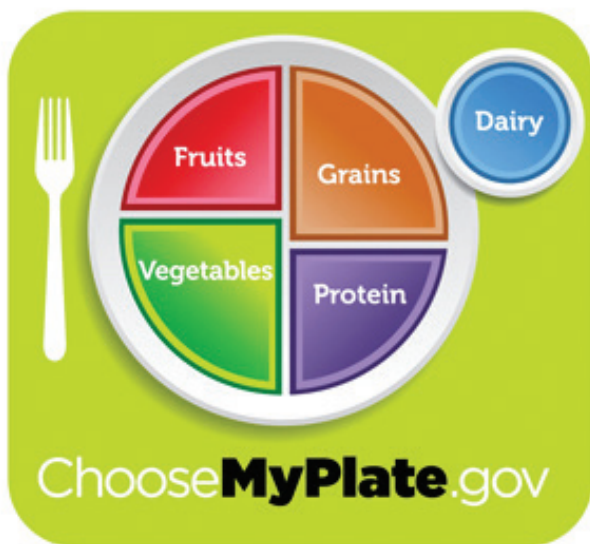
Physical activity plays an important role in weight management. Physical activity increases the number of calories the body uses, although the number of calories used depends on the type, intensity, and duration of the activity. For substantial health benefits, the Dietary Guidelines for Americans recommends adults engage in 150 minutes a week of moderate-intensity or 75 minutes a week of vigorous-intensity physical activity. For additional and more extensive health benefits, adults should increase their physical activity to 300 minutes a week of moderate-intensity or 150 minutes a week of vigorous-intensity activity.

The goal for healthy weight loss is to lose body fat while maintaining lean body mass and muscle. Weight loss should be gradual, 1/2 pound to two pounds per week, for both athletes and non-athletes. Rapid weight loss increases loss of lean body mass and muscle. There also is a higher risk of regaining weight lost rapidly. The best combination for weight loss is a regular fitness program along with a well-balanced, low-fat diet following the USDA Daily Food Plan.

Weight loss may seem small at first when using a combination of diet and increased physical activity, because muscle mass increases at the same time body fat decreases. However, greater weight loss becomes apparent as body fat loss continues and muscle gain levels off.

For athletes, the competitive season is not the time for either weight loss or weight gain. The off-season is the time to adjust body weight so athletes enter their competitive season at their optimal weight.

All weight loss techniques involving loss of body water are dangerous. Water loss results in decreased blood volume and reduced blood flow to the kidneys, skin, and muscles. This hinders the body's ability to



sweat and regulate body temperature, and increases the risk of dehydration.

## Carbohydrate

Carbohydrates are found in many foods including breads, cereals, grains, fruits, vegetables, and dairy foods. Carbohydrates should supply more than half of the calories consumed daily. A high carbohydrate diet increases muscle glycogen. Muscle glycogen provides an energy reserve for greater endurance and delays fatigue. Increased muscle glycogen is helpful for athletic events lasting longer than 90 minutes. Athletes may use a modified carbohydrate loading plan to increase muscle glycogen. This plan involves reducing workouts the week before an event and complete rest the day before an event. Along with reduced workouts, the athlete begins eating a high carbohydrate diet three days before the event.

## Protein

Protein is found in many foods including meat, poultry, fish, dry beans, eggs, nuts, milk, yogurt, and cheese. The Dietary Reference Intake for protein for healthy adults is 0.8 grams protein per kilogram body weight. Competitive athletes sometimes need one to one and a half grams of protein per kilogram body weight. This higher amount of protein can easily be obtained from a well-balanced diet with a variety of foods.

The increased need for protein does not mean athletes need amino acid or protein supplements. There is no evidence that amino acid or protein supplements increase muscle mass. In fact, excessive amino acid or protein supplements can be harmful. Products from protein breakdown are excreted in the urine increasing water loss and risk of dehydration.

## Fat

Carbohydrates and protein provide most of the daily calorie needs. Fat is used for the remaining calories. For good health, the Dietary Reference Intakes (DRI) recommend a diet low in saturated fat, trans fat, and cholesterol, and one which provides 20 to 35 percent of the daily calories intake from fat.

## Vitamins and Minerals

Vitamins and minerals have important roles in carbohydrate, protein, and fat metabolism. Without vitamins and minerals there would be no muscle function. Physical activity increases the need for some vitamins and minerals. A well-balanced diet will supply enough vitamins and minerals to cover any increased need due to activity. There is no evidence that athletes need extra vitamins and minerals if they consume a well-balanced diet. There is also no evidence that vitamin and mineral supplements improve athletic performance.

Iron is a mineral that is very important for both physically active women and young athletes. Iron is part of hemoglobin, the protein that carries oxygen from the lungs to the muscles. "Sports anemia" is a condition that sometimes occurs in athletes due to increased blood volume associated with initial training. This condition is usually temporary and does not affect athletic performance. However, iron deficiency can lead to fatigue and hinder athletic performance. Red meat is a rich source of iron that is easily absorbed by the body. Fortified breads and cereals and green, leafy vegetables, such as broccoli and spinach, also provide iron. However, iron from plant foods is not as easily absorbed as iron from animal sources by the body. Increase the absorption of iron from plant foods by eating them in combination with animal sources or foods rich in vitamin C, such as orange or tomato juice.

Calcium is also a mineral that is very important for physically active women and young athletes. Low body fat levels and high physical activity may hinder bone development in young female athletes. Adolescence and early adulthood is a time when maximum bone formation occurs. Decreased bone development can increase the risk of stress fractures and hurt athletic performance. It is important that all athletes, especially young female athletes, consume adequate dairy products such as milk, yogurt, and cheese for calcium. Calcium is also found in dark-green leafy vegetables, fortified breads and cereals, and calcium fortified orange juice.

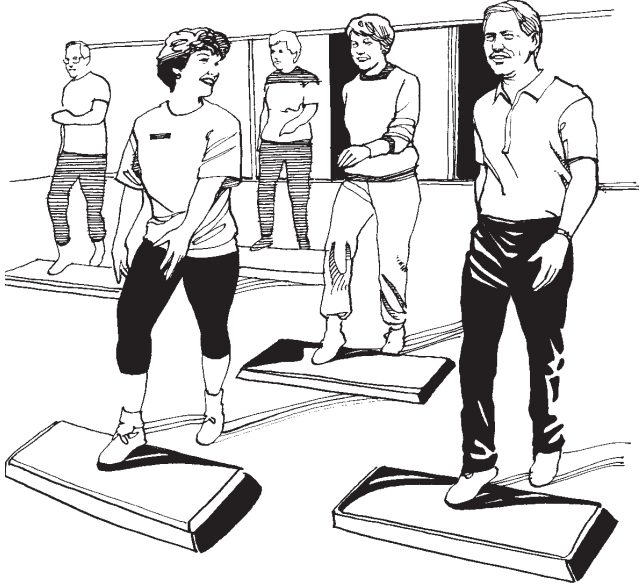
## Fluids

Physical activity results in increased heat production in the body. The main way the body removes heat is by sweating. Water loss from sweating can decrease muscle strength, endurance, coordination, and increase risk of cramps. Excessive body water loss can result in heat exhaustion and heat stroke, which can lead to death.

Replacing water lost by sweating is the best way to prevent dehydration. Thirst is not a good indicator of water need. Weighing before and after physical activity is an easy way to determine the amount of body water lost through sweat. It requires one pint (2 cups) of fluid to replace each pound of body water lost in physical activity.

Guidelines for fluid intake before athletic events include drinking extra water for several days before an event in order to start the event well hydrated. Guidelines for fluid intake during athletic events are two cups to three cups of fluid, two hours to three hours before the event; and one to two additional cups of fluid, 15 to 20 minutes before the event. Small ( $\frac{1}{2}$ -cup to one cup) servings of plain cool water should be consumed frequently throughout the event.

For most individuals exercising less than one hour, cool water is the best way to replace fluids. The typical



American diet provides enough sodium and other minerals to replace those lost through sweat. Sports drinks may be useful when exercising over one hour or in high temperature or humidity conditions. The body easily absorbs sports drinks containing six to eight percent glucose or sucrose with a small amount of sodium. These drinks help maintain blood glucose, without causing stomach cramps. Concentrated sports drinks, or sports drinks containing fructose, may cause stomach cramps.

## Ergogenic Products

Ergogenic products claim to provide energy, improve strength or endurance, or improve athletic performance. Examples of ergogenic products include: bee pollen, caffeine, glycine, carnitine, lecithin, brewer's yeast, gelatin, amino acids, protein supplements, and vitamin/mineral supplements. There is no scientific evidence that ergogenic aids improve athletic performance. These products may hinder both health and athletic ability when they replace sound dietary practices.

## Dietary Recommendations for Exercise or Competition

**Before Exercise or Competition:** Food eaten before exercise or competition can help prevent low blood sugar, provide energy, and settle the stomach. However, what to eat before exercise or competition varies from person to person and from activity to activity. Some people can eat almost anything, while others have no desire to eat anything.

High carbohydrate foods can help maintain blood sugar levels. Some examples of high carbohydrate foods include yogurt, bananas, pasta, crackers, bread,

or bagels. Some people can tolerate small amounts of sugary foods just before events; however, for others these types of foods can cause a drop in blood sugar.

Foods that cause stomach or intestinal problems such as high fat, high protein, or fiber should be avoided. Some can tolerate a liquid meal that provides a good balance of fluid and nutrients better than food.

Allow enough time for food to digest. A general rule is to allow at least three to four hours for a large meal to digest, two to three hours for a smaller meal, one to two hours for a liquid meal, and less than an hour for a small snack.

What and when to eat should be tested before a competition. Don't try new routines the day of a competition.

**During Exercise or Competition:** For events lasting less than 60 minutes, consuming carbohydrate during the event is not usually helpful. For events lasting longer than 60 to 90 minutes, consuming small amounts of fluid and small amounts of carbohydrate (0.5 grams carbohydrate per pound body weight) every hour may delay fatigue. The type of carbohydrate tolerated will vary from person to person. Some people can tolerate carbohydrate-containing foods while others can better tolerate carbohydrate-containing beverages. Try this during practice. Do not try consuming carbohydrates for the first time during a competition.

**After Exercise or Competition:** The top dietary priority is to replace fluids lost through perspiration. Consuming a small amount of food or beverage high in carbohydrate and low in fat, fiber, and protein within 15 minutes of exercise or competition helps to replace muscle glycogen stores. The type of carbohydrate tolerated after exercise or competition will vary for each person.

## Summary

Nutrition is an important factor affecting fitness and athletic performance. Whether one participates in physical activity for personal fitness or for competition, the best nutritional recommendations are to consume adequate fluids and a well-balanced diet from a variety of foods following the USDA Daily Food Plan.

## References:

- United States Department of Agriculture. ChooseMyPlate.gov. Accessed at: [www.choosemyplate.gov](http://www.choosemyplate.gov)
- United States Department of Agriculture. Dietary Guidelines for Americans 2010. Accessed at: <http://www.cnpp.usda.gov/DietaryGuidelines.htm>
- Whitney, E.N. & Rolfes, S.R. Understanding Nutrition, 13<sup>th</sup> ed. 2013. Thomson/Wadsworth Publishing Co., Belmont, CA.

## The Oklahoma Cooperative Extension Service

### *Bringing the University to You!*

The Cooperative Extension Service is the largest, most successful informal educational organization in the world. It is a nationwide system funded and guided by a partnership of federal, state, and local governments that delivers information to help people help themselves through the land-grant university system.

Extension carries out programs in the broad categories of agriculture, natural resources and environment; family and consumer sciences; 4-H and other youth; and community resource development. Extension staff members live and work among the people they serve to help stimulate and educate Americans to plan ahead and cope with their problems.

Some characteristics of the Cooperative Extension system are:

- The federal, state, and local governments cooperatively share in its financial support and program direction.
- It is administered by the land-grant university as designated by the state legislature through an Extension director.
- Extension programs are nonpolitical, objective, and research-based information.
- It provides practical, problem-oriented education for people of all ages. It is designated to take the knowledge of the university to those persons who do not or cannot participate in the formal classroom instruction of the university.
- It utilizes research from university, government, and other sources to help people make their own decisions.
- More than a million volunteers help multiply the impact of the Extension professional staff.
- It dispenses no funds to the public.
- It is not a regulatory agency, but it does inform people of regulations and of their options in meeting them.
- Local programs are developed and carried out in full recognition of national problems and goals.
- The Extension staff educates people through personal contacts, meetings, demonstrations, and the mass media.
- Extension has the built-in flexibility to adjust its programs and subject matter to meet new needs. Activities shift from year to year as citizen groups and Extension workers close to the problems advise changes.

Oklahoma State University, in compliance with Title VI and VII of the Civil Rights Act of 1964, Executive Order 11246 as amended, Title IX of the Education Amendments of 1972, Americans with Disabilities Act of 1990, and other federal laws and regulations, does not discriminate on the basis of race, color, national origin, gender, age, religion, disability, or status as a veteran in any of its policies, practices, or procedures. This includes but is not limited to admissions, employment, financial aid, and educational services.

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, the Director of Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Vice President, Dean, and Director of the Division of Agricultural Sciences and Natural Resources and has been prepared and distributed at a cost of 20 cents per copy. Revised 0914 GH