

# Section 8

## Fitness

## Concepts

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**Name/Title: Spongy Hydration**

**Purpose of Event:** After the lesson, the students should be able to understand why humans need water to live and function best.

**Suggested Grade Level:** K-2

**Materials Needed:** A small piece of sponge for each student, water source (cups, a sink, etc.) Planting seeds that can be used on a sponge and one small dish to hold the "wet" sponge.

### Description of Idea

Begin class by explaining what hydration means and why it is important to our bodies. (For example: "It helps keep you cooler in the summer," or "you might not feel as tired if you drink enough water." Tell the students that our bodies are made mostly of water, and it works best when it has lots of water.

Give the students bone-dry sponges and let them try to clean their desks with them. The sponges will not work very well without water--and neither do our bodies. Next, completely saturate the sponges and let the students wipe their desks. The students should see that the hydrated sponges work great--just like our hydrated bodies. However, the sponges will lose water over time and not work as well. This is similar to how our bodies sweat and lose water as we work. The students should see the connection. For sponges and our bodies to function best again, water has to be replaced.

Secondly, have students scatter seeds on a dry sponge and scatter seeds on a wet sponge, sitting in a small plate to which water can be added. When the seeds sprout a better connection will be made to water being necessary to "life" and connected to the previous descriptions about how our body works with water.

**Assessment Ideas:**

1. Check for understanding with questions.
2. Ask the students if they can show you dehydrated sponges (they should squeeze out their sponges).
3. When using the seed "idea," ask students to think about what will happen to the seeds with water and without, and explain why, either with paper/pencil or with class discussion.

**Teaching Suggestions:**

You may also add hydrated body weight to dehydrated body weight to this lesson by using a dietetic scale to weigh dry versus wet sponges.

You may also talk about what that best fluid is for rehydrating your body. For example, water versus sport drinks.

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Submitted by Eric Guth who teaches at Christ Church Episcopal School in Greenville, SC. Thanks for contributing to PE Central! **Posted on PEC: 2/14/2007**. Printed 2271 times since 9/28/2005.

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## Thirsty Water



*Submitted by*  
Betty of Betty's Blog

Students do experiments to learn how hydration and water affect their health.

**Grades(s)** K, 1, 2

**Subjects(s)** Health & Nutrition, Math, Physical Education

### **Objective**

Give each child an index card and have them write or draw their favorite beverage on the card. Collect the cards and read them to the class without identifying the students. Make a bar graph demonstrating the results.

Discuss the nutritional value of all of the chosen beverages with the class. Talk about hydration and explain to the students that since our bodies are mostly made of water, we function best when we drink plenty of water.

Using a stick of celery and red food dye, show the students how a thirsty plant takes in food. Add the red dye to a clear plastic glass, and place the celery in the glass. Students can see the water working its way through the veins of the celery.

Divide the students into pairs and give them two containers, two sponges, and ten pinto beans. Leave one sponge dry and place five beans on it. Dip the other sponge in water, and place five beans on it. Have the students predict what will happen.

Discuss perspiration with the students. Have them run in place by their desks, and serve ice water after the activity. Lead a discussion about the difference between water, soft drinks, and sport drinks.

### **Materials**

Class set of small sponges, seeds, plastic butter containers, bar graph on a chart, index cards, celery, red food dye

### **Lesson**

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Discuss perspiration with the students. Have them run in place by their desks, and serve ice water after the activity. Lead a discussion about the difference between water, soft drinks, and sport drinks. Identify the nutrition and health aspects of hydration for this lesson plan.

### Assessment

Students draw a picture showing their understanding of hydration. Fold the paper in half. One half shows how things look without water, and the other side shows things that are hydrated and getting plenty of water. Examples might be flowers, trees, grass, etc.

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Fatigue..... is there an energy crisis? According to the statistics, yes! Why are we so tired? In this book, we will attempt to answer this question and discuss solutions to the energy crisis. We will determine how we can assist our body in the attainment and preservation of energy. Let's start with some basic information. Then we will end this section with a look at the "Energy Equation".

## **HOW IS THE BODY FUELED?**

Before we get into details of discussing the energy equation, we must first look at how the body receives energy and how it uses fuel to create energy. Knowing the basics of how the body works will enable us to discover the best way to fuel the body and to understand how the body will burn this energy to create movement. We must also keep in mind that every "body" is different and unique in its requirements for energy. What works for one person may be a complete disaster for another. So, keep this in mind as we discover the basics of how our body works.

## **THE FIRST FUEL**

Did you know that there is fuel right now available in your cells? As you are sitting in your chair, your body has fuel available for you if you decided to jump up and leap into the air. How is this possible you ask? Well, let's take a look.

In your muscle tissue there is a short-term energy source available without the need for oxygen. This energy source is called ATP (Adenosine Tri-phosphate) and CP (Creatine Phosphate). We give you these large words so you can impress your friends during your next scrabble game. This energy source is just enough to allow you to leap into the air and it lasts for about 10 seconds. Then if you decide to jump up and down many times your amazing body has yet another source of stored energy in the muscle cells. This uses another energy pathway called the lactic acid system. It sounds kind of painful and in fact you'll notice that your muscles will start to send a burning sensation to your brain. That is lactic acid build up in your muscle tissue. What happens is that your muscles have to convert carbohydrates into ATP to provide movement. Without the presence of oxygen, carbohydrates are only partially broken down and that produces lactic acid.

This is why we need to slow down and use our aerobic pathway to get more energy to do lots of smaller jumps. The aerobic pathway is our long-term energy production pathway and it allows us to keep jumping. The fuels in this pathway are both fat and stored carbohydrates. Proteins can be used, but are not the preferred fuel.

## **FOOD AS FUEL**

Our body needs energy from food to keep up the supply of ATP for energy production. We need to continually feed our "machine" good quality food for fuel to make it work.

Just like a car engine - it will run smoothly with proper care but with neglect it will need extra tune-ups and maintenance.

The two sources of food in the body that are converted to energy are Carbohydrates and Fats. Proteins are needed to continuously repair and build muscle and tissue.

Food is an indirect fuel source, as it cannot be used directly by our muscles for energy. Instead the energy is released from the breakdown of foodstuffs and used to manufacture a biochemical compound, the ATP we discussed earlier. So, it is very important that we fuel our body correctly with what it needs to perform at peak efficiency.

When our body receives the food that we give it, it has to decide what to do with it. What is used for energy production, what is absorbed as nutrients, what is expelled as waste products and if there is extra - it will be stored as fat. We will discuss this more fully in our nutrition section.

## **WATER AS FUEL**

Water is another absolute source of energy. Water is basic to our very being. Simply put, we can't live without it. Our brain and our body are made up of mostly water. We need water to help our body break down our food enabling us to use the vitamins and minerals needed to build our body's cells.

If we are dehydrated, we become fatigued and lose our energy very quickly. Did you know that the number one cause of fatigue is the lack of water in our body?

## **PHYSICAL ACTIVITY AS FUEL**

We also need physical activity in our lives to keep our energy levels high. If you don't use it, you lose it! Our bodies are designed to move and move them we must. We need to exercise and massage our internal organs, oxygenate our blood and tone our muscles to allow us to live our lives.

To feel energetic, we need to have toned, strong muscles, and the ability to move quickly and with confidence.

## **REST AS FUEL**

Another definite need for energy is sufficient rest; rest for our body and rest for our mind. In this Workbook, we will examine sleep and our body's need for rejuvenation – time to rebuild and repair to keep us energized.

**To Order "Building Energy", Please Visit [THEGROWTHSHOP.com](http://THEGROWTHSHOP.com)**

Home / Teachers / Helping Others to Feed Themselves / What Is the Food Pyramid?

## What Is the Food Pyramid?

### Lesson 1:

From Unit [Helping Others to Feed Themselves](#)

#### Kindergarten-2nd Grade

##### Subjects:

Health and PE, Language Arts, Library /  
Technology, Philanthropy, Science and  
Social Studies

##### Key Words/Concepts [click to view](#)

#### Purpose:

The purpose of this lesson is to introduce the USDA Food Pyramid and motivate the students to seek good nutrition.

#### Duration:

One Forty-Five Minute Class Period

#### Objectives:

*The learners will:*

- respond to *The Berenstain Bears and Too Much Junk Food*.
- discuss prior knowledge about good nutrition.
- identify food groups of the USDA Food Pyramid.
- work cooperatively with the class to assemble a food pyramid puzzle.

#### Materials:

- The *Berenstain Bears and Too Much Junk Food* (see **Bibliographical References**), by Jan and Stan Berenstain and/or another book from the bibliographical references
- Large Food Pyramid Poster or labeled drawing on the chalkboard
- Access a printable version of the Food Pyramid at [http://teamnutrition.usda.gov/Resources/mpk\\_poster.pdf](http://teamnutrition.usda.gov/Resources/mpk_poster.pdf) and print copies to make puzzles. Cut the pyramid into the different food groups. Laminate the puzzles for durability. Optional: Enlarge the pyramid pieces and laminate. Put magnets on the back of each piece to make a large class-size puzzle for the magnetic board.

#### Instructional Procedure(s):

##### *Anticipatory Set:*

Show students the book *Berenstain Bears and Too Much Junk Food* by Stan and Jan Berenstain. Ask them to tell you what junk food is. Find out what they already know about junk food. Ask the students to reflect on the question: "What if you ate too much junk food?" Read the book. After reading, discuss the lesson that the bears learned. Ask the students to raise their hands if they eat well. Ask the students to explain what is wrong with junk food.

- Put up a poster or drawing of the Food Guide Pyramid and tell the students that this is the daily food guide recommended by the USDA. The guide shows us what foods we need each day and in what proportions.
- Explain that people, like all animals, need food for energy. We need the right amounts of good food to keep our bodies healthy so we are able to play and work at our best.
- Explain the different food groups and call attention to the sizes of the sections of the food-guide pyramid. Help the students understand that the recommended amount to eat from each food group is represented by the amount of space it is given on the food pyramid. For example, the grain group takes up the entire bottom portion of the food pyramid because the recommended 6-11 servings is double the amount recommended of any of the other food groups.
- Ask students to name foods that they enjoy from each of the food groups.
- Emphasize that the food pyramid is a guide that helps us make choices. Ask the students to recall choices they have made about eating that either had positive or negative consequences.
- Play a game called "name that food group." To play, divide the class into two teams. Have one person from each team come to the front of the room at a time. Place a bell between the two players. When you name a food, the first player to ring the bell names the



food group to which the food belongs. If he/she cannot name the food group, the second team gets a chance to name the food group. The team whose player correctly names the food group receives a point. Play continues with new players until each child has had a turn. The team with the highest number of points wins the game.

- Divide the class into small groups and give each group a food pyramid puzzle to put together. As they work, they can talk about the foods on the pyramid. Have each student name at least one nutritious food he or she has eaten today and name the food group from which it comes.
- Tell the students that tomorrow they will learn how to put together a balanced food menu. Ask them to pay attention to their dinner meal tonight and be ready to discuss it tomorrow.

#### Assessment:

Observe student participation in the food group game and in the building (and discussion) of the food pyramid puzzle. You should also assess their understanding from their response to the Berenstain Bears book.

#### School/Home Connection:

Send a note home explaining that the children are learning about nutrition and that their homework is to pay attention to the elements of their evening meal (see **Attachment One: Making Healthy Food Choices Family Letter**).

#### Extension:

- Southwest Educational Development Laboratory has a complete nutrition unit which includes curriculum integration and the use of learning centers. Download the lesson at <http://www.sedl.org/scimath/pasopartners/pdfs/health.pdf>,
- Discuss "opportunity cost" when you talk about making food choices. If you choose junk food over nutritious food, what is the opportunity cost? For the opportunity to eat junk food, your cost is that you may not be as healthy or feel as good.
- Tie In the science concept of "consumers." As we purchase and eat foods, we are consumers in the food chain. All animals are dependent upon plants as the producers.
- Discuss family and family roles in providing food as it relates to the story about the Berenstain Bears.

#### Bibliographical References:

- Berenstain, Jan and Stan. *The Berenstain Bears and Too Much Junk Food*. New York: Random House, 1985. ISBN: 0394872177
- Leedy, Loreen. *The Edible Pyramid: Good Eating Every Day*. Scott Foresman, 1996. ISBN: 0823412334
- Riccio, Nina. *Five Kids & A Monkey Solve the Great Cupcake Caper: A Learning Adventure about Nutrition and Exercise*. Creative Attic, 1997. ISBN: 0965395510
- Sharmat, Mitchell. *Gregory, the Terrible Eater*. New York: Scholastic Trade, 1989. ISBN: 0590433504
- For other Food Pyramid activities and information: <http://www.mypyramid.gov/kids/index.html>
- The National Dairy Council has free nutrition lesson plans and materials for teachers. Call to order at 800-426-8271. You can visit the Website to find the local Dairy Council and see sample lessons and activities at Nutrition Explorations <<http://www.nutritionexplorations.org/utility/findDC.asp>>
- *Southwest Educational Development Laboratory*, 22 July 2002, < <http://www.sedl.org/scimath/pasopartners/pdfs/health.pdf>>

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#### Lesson Developed and Piloted by:

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**Handout 1**

**Making Healthy Food Choices Family Letter**

Dear Family,

Today we studied the USDA Food Pyramid and learned about the different food groups. At your house, you may find copies of the food pyramid on boxes of crackers or cereal and other packages. Ask your child to tell you what he or she learned about making healthy food choices.

Tonight, as you eat dinner, discuss the foods that you are eating and relate them to the categories on the food pyramid. We will be using the information at school, and the children need to be prepared to discuss the foods from their evening meals.

Sincerely,

## **STUDENT HANDOUT**

### **BENEFITS OF EXERCISE**

Why exercise? Here is a list of some of the many benefits of exercise.

1. IT GIVES YOU MORE ENERGY
2. IT HELPS YOU COPE WITH STRESS
3. IT IMPROVES YOUR SELF-IMAGE
4. IT HELPS YOU TO LOSE WEIGHT
5. IT TONES YOUR MUSCLES
6. IT INCREASES YOUR RESISTANCE TO FATIGUE
7. IT HELPS YOU TO FEEL RELAXED AND LESS TENSE
8. IT HELPS TO CONTROL YOUR APPETITE
9. IT COUNTERS ANXIETY AND DEPRESSION
10. IT IMPROVES YOUR ABILITY TO FALL ASLEEP AND SLEEP WELL
11. IT PROVIDES AN EASY WAY TO SHARE AN ACTIVITY WITH FRIENDS

# Drink water to regulate body temperature

**1ST LT. JOETTA KHAN and BRUCE GRAMLICH**  
WBAMC

Maintain hydration to avoid dehydration. There are many products available to assist you in maintaining hydration. Let's examine water versus sport drinks. Water is necessary for maintaining health, but when you are really thirsty, are sports drink a better choice than water?

In addition to water, sports drinks contain sugar and electrolytes like sodium and potassium. Sugar is the primary source of energy in the human body. The electrolytes are important in your body also. However, unless you are running a marathon, the average American gets energy and electrolytes from food. The added sugar, vitamins, and minerals may make the sports drink more appealing.

Why is water so important in maintaining health? The average adult is approximately 60 percent water. This water is needed in the body for many reasons. Water helps regulate body temperature. When it is really hot or when you become hot during exercise, you cool yourself down by producing sweat. Sweat is a combination of water and electrolytes, such as sodium and potassium, which are also very important in the body. When you lose too much water and electrolytes, you must take in more to keep your body healthy.

In an 8-ounce serving, along with electrolytes, the average sports drink contains 14 to 19 grams of carbohydrates. Be aware that most bottles contain more than two servings. One 32-ounce bottle of your favorite sports drink could contain up to 60 grams of carbohydrate. If you have an inactive lifestyle that extra sugar isn't necessary. On the other hand, if you are training more than 60 minutes a day, then this may be a great way to refill some of the energy used during exercise.

If you are watching your weight, sports drink can be an unnecessary source of calories. If you are trying to loose weight, don't drink anything with more than 10 calories per serving. There are flavored waters available that have added vitamins and minerals but have very little if any sugar in them. Those would be a great choice for someone who is looking for something more flavorful than water but without extra calories, artificial coloring, and added preservatives.

If you participate in more than 60 minutes of vigorous exercise a day, a sports drink is an excellent way to replenish lost energy and electrolytes. After 60 minutes of hard exercise, the body has used much of the natural stores of energy and possibly some minerals. However, if you exercise less than 60 minutes a day, then drinking the standard eight cups of

water a day is enough.

There are other contributing factors to hydration status besides sugar content. If you suspect you are dehydrated and are looking for more water intake, stay away from beverages with caffeine in them, especially coffee and tea. Caffeine is a diuretic which means instead of adding water, the body actually loses water stores through increased urination.

If you dislike drinking water, then the decision of what to drink is not difficult to make. You automatically reach for the yellow or blue sports drink because you need a little more flavor to your beverage than just plain water. Just remember the average person does not require sports drinks in order to replenish lost nutrients. Sports drinks are often a source of calories that make it hard to lose weight. Try flavored water with 10 or less calories, rather than drinking your calories in beverages flavored with sugar.

The bottom line is to drink what tastes good to you; but know what additives have been added to the drinks you choose to consume. Drinking water is an important part of staying healthy and drinking frequently throughout the day is a good habit to form.

For information on hydration issues and sports drinks, call 569-3517. For general information on health promotion issues, contact 569-2759.

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## Blood Volume

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As a general matter of health, optimum blood volume is essential to the proper function of the body's cardiopulmonary and circulatory systems. Blood is a significant mass within the body, with an average volume for an adult of 51. liters (1); blood typically represents approximately 8% of body mass. For an elite-level endurance athlete, the blood volume may be 30% greater than that of the average adult.

Blood is composed of solid and liquid elements. Plasma, composed of 90% water, is the liquid that transports various types of dissolved particles as well as blood cells. The cells contained the human blood stream are erythrocytes, leukocytes, and platelets. Erythrocytes are the red blood cells that contain hemoglobin, the protein that transports oxygen within the body, as well as carry the waste carbon dioxide produced by the body. Leukocytes are the white blood cells that are responsible for attacking infection and other hostile organisms within the body. There are five different types of white blood cells operating within the bloodstream. Platelets are the colorless bodies that adhere to one another to create blood clots that stop bleeding both in exterior wounds as well as internal bleeding.

The body regulates blood volume through the operation of the kidneys. When the kidneys determine that the blood volume is too high, water and sodium are excreted into the urine. To reverse this process, the kidney will retain sodium and increase water levels within the body. As blood, through plasma, is 90% water, this process has an immediate impact upon blood volume.

The relationship between blood volume and blood pressure is an important one. Blood pressure is a function of the amount of blood pumped by the heart and the degree of resistance to the flow of blood made by the arteries. The circulatory system, the interconnected series of arteries, veins, and capillaries through which blood flows in the body, has a number of internal mechanisms by which blood pressure is controlled. When blood pressure is too great, the heart is required to work harder than is desirable, among other effects. When blood pressure is too low, it may be indicative of low blood volume, or other conditions. Increased blood volume can cause a corresponding high blood pressure.

Blood volume is of particular interest to an endurance athlete. One of the first physiological changes observed in an athlete who begins an endurance training program is an increase in blood volume. This volume increase is the body's response to the demands placed upon it by this type of training. Greater

amounts of oxygen are required to be transported by the red blood cells, along with greater demands internally for fluid, due to increased needs to cool the body through sweating.

The legitimate increases in the blood volume of an endurance athlete will be the result of determined and focused training. The natural expansion of blood volume can be enhanced through altitude acclimatization, or altitude training, as well as through heat training. The decreased amount of oxygen in high altitudes stimulates the body into the production of the hormone erythropoietin (EPO) made in the kidneys. EPO then triggers the production of more red blood cells to transport sufficient oxygen to make up the deficiencies at altitude. Significant blood volume benefits from altitude training occur within one to three months of commencement; the benefits are retained on a declining basis for up to three months.

When endurance athletes train in temperatures in excess of 77°F (25°C), the body will become accustomed to retaining the mineral sodium, which is commonly excreted through the skin's pores when the body is exposed to significant heat (sweating). The greater the level of sodium remaining in the body, the greater the amount of water that will be retained by the body, which has the effect of maintaining blood volumes. Blood volumes will be increased through hot weather training within 14 days.

Since the relationship between blood volume, oxygen transport ability, and endurance performance became well established, athletes have used illegal methods to increase blood volume. In recent years, these efforts have centered on the injection of a synthetic form of EPO, to increase red blood cell production. A related class of pharmaceuticals, known as plasma expanders, also achieved the goal of greater blood volume. EPO and plasma expanders are prohibited substances in international competitions and world championships; detection of such substances in the urine samples of athletes will disqualify them, as well as subject them to a suspension from competition.

Unless the person illegally ingesting these substances possessed a high baseline of physical conditioning, such as a very fit, highly trained endurance athlete, the additional red blood cell and blood volume capabilities these techniques afforded would be negligible. Further, artificial increases to the red blood cell levels in the bloodstream expose the user to greater risk of stroke, due to the denser, more viscous nature of the modified blood.

**SEE ALSO** [Acclimatization](#); [Blood doping](#); [Cardiovascular system](#); [EPO](#); [World Anti-Doping Agency \(WADA\)](#).

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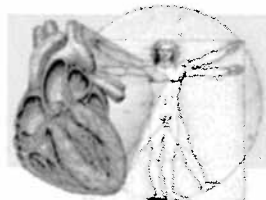
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# Cardiovascular Physiology Concepts

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## Blood Volume

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Blood volume is determined by the amount of water and sodium ingested, excreted by the kidneys into the urine, and lost through the gastrointestinal tract, lungs and skin. The amounts of water and sodium ingested and lost are highly variable. To maintain blood volume within a normal range, the kidneys regulate the amount of water and sodium lost into the urine. For example, if excessive water and sodium are ingested, the kidneys normally respond by excreting more water and sodium into the urine. The details of how the kidneys handle water and sodium are beyond the scope of this cardiovascular web site; therefore, the reader is encouraged to consult general medical physiology textbooks to learn more about this topic. The following paragraphs briefly describe how renal excretion of water and sodium are regulated and how blood volume affects cardiovascular function.

### Regulation of Blood Volume by Renal Excretion of Water and Sodium

The primary mechanism by which the kidneys regulate blood volume is by adjusting the excretion of water and sodium into the urine. There are several mechanisms by which this regulation occurs. For example, increased blood volume increases arterial pressure, renal perfusion, and glomerular filtration rate. This leads to an increase in renal excretion of water and sodium that is termed *pressure natriuresis*. In certain types of renal disease, the pressure natriuresis relationship is altered so that the kidneys retain more sodium and water at a given pressure, thereby increasing blood volume.

Activation of the renin-angiotensin-aldosterone system causes increased sodium retention which also leads to reduced water loss into the urine. Both angiotensin and aldosterone, although by different mechanisms, stimulate distal tubular sodium reabsorption and decreases sodium and water loss by the kidney. Activation of the renin-angiotensin-aldosterone system occurs in renal artery stenosis, which is one cause of secondary hypertension. Drugs that block the formation of angiotensin II (i.e., angiotensin converting enzyme inhibitors), or block aldosterone receptors (e.g., spironolactone) enhance sodium and water loss, and thereby reduce blood volume. Therefore, any mechanism or drug that alters the activity of the renin-angiotensin-aldosterone system will affect blood volume.

Another important hormone in regulating water balance is vasopressin (antidiuretic hormone; ADH). This hormone is released by the posterior pituitary. One of its actions is to stimulate water reabsorption in the collecting duct of the kidney, thereby decreasing water loss and increasing blood volume.

### How Blood Volume Affects Blood Pressure

Changes in blood volume affect arterial pressure by changing cardiac output. An increase in blood volume increases central venous pressure. This increases right atrial pressure, right ventricular end-diastolic pressure and volume. This increase in ventricular preload increases ventricular stroke volume by the Frank-Starling mechanism. An increase in right ventricular stroke volume increases pulmonary venous blood flow to the left ventricular, thereby increasing left ventricular preload and stroke volume. An increase in stroke volume then increases cardiac output and arterial blood pressure.

RK Revised 04/01/2007

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**Exercise intensity: Why it matters, how it's measured**

By Mayo Clinic staff

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**Original Article:**<http://www.mayoclinic.com/health/exercise-intensity/SM00113>

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**Exercise intensity: Why it matters, how it's measured**

**When it comes to exercise intensity, moderate is usually best. When you're working out, know when to pick up the pace — and when to back off a bit.**

By Mayo Clinic staff

Do you think about exercise intensity when you're doing physical activity? Better yet, do you know how to measure exercise intensity? Consider these simple strategies for monitoring how hard you're exercising — and getting the most out of your workouts.

**Exercise intensity defined**

The intensity at which you exercise reflects the amount of oxygen your body uses to do an exercise and the number of calories you burn while doing it. In aerobic activity — such as walking, swimming or cycling — exercise intensity translates into how hard the activity feels to you.

As a general rule, moderate-intensity activity is best. If you exercise too lightly, you may not meet your fitness or weight-loss goals. If you push yourself too hard, you may increase your risk of soreness, injury and burnout. Moderate-intensity activity decreases these risks and may even increase the odds that you'll continue your exercise program in the long run.



## Measure your exercise intensity

Moderate-intensity activity should feel somewhat hard. Watch for these telltale signs:

- You're breathing faster.
- You're developing a light sweat.
- You're feeling some strain in your muscles.

You can also use the talk test. If you can carry on a conversation of brief sentences but you can't sing a song, you're probably exercising in the recommended moderate-intensity range.

## Do the math

If you'd rather get more specific, use your heart rate to estimate your exercise intensity. If you're a healthy adult doing vigorous activity, aim for a target heart rate of 70 to 85 percent of your maximum heart rate — the upper limit of what your cardiovascular system can handle during physical activity. If you're not fit or you're just beginning an exercise program, aim for 40 to 50 percent of your maximum heart rate. As your fitness improves, increase the intensity of your workouts.

To determine your target heart rate, use an online target heart rate calculator. You can also do the math yourself. If you're aiming for a target heart rate of 70 to 85 percent:

- Subtract your age from 220. This is a rough calculation of your maximum heart rate.
- Determine the lower end of your target heart rate by multiplying your maximum heart rate by 0.7.
- Determine the upper end of your target heart rate by multiplying your maximum heart rate by 0.85.

So how do you use this information? While exercising, check your pulse.

To check your pulse over your carotid artery, place your index and third fingers on your neck to the side of your windpipe. To check your pulse at your wrist, place two fingers between the bone and the tendon over your radial artery — which is located on the thumb side of your wrist. When you feel your pulse, look at your watch and count the number of beats in 10 seconds. Multiply this number by 6 to get your heart rate per minute.

If you have an irregular heart rhythm or you're taking medication that affects your heart rate, ask your doctor about the best way to measure your exercise intensity.

## Reap the rewards

You'll get the most from your workouts if you're exercising at the proper intensity. If you're not feeling any exertion or your heart rate is too low, pick up the pace. If you're worried that you're pushing yourself too hard or your heart rate is too high, back off a bit. Either way, know that you're doing what it takes to maximize your workout.

### References

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Feb. 21, 2009

SM00113

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# Nutrition Reference Guide

SPARKDIET RESOURCE CENTER



Nutrition Reference Guide

Check out these other important nutritional items as well.

- Introduction
- Carbohydrates
- Proteins
- Fats
- Minerals
- Vitamins
- Fiber
- Calorie

## Overview - Eating Well

The food you eat is the source of energy and nutrition for your body. Eating should be a pleasurable experience, not one that causes guilt or remorse. Getting enough food is rarely a problem, but getting enough good nutrition can be a challenge. What should you eat to stay healthy? Nearly everyone has an opinion, from your best friend to the daily newscaster. There is a lot of advice available, but the basics for good health have not changed since the first fad diets were introduced centuries ago.

## Nutrients

Your body needs over 45 different nutrients every day. These nutrients are essential for health and must be provided in the foods eaten. These nutrients can be divided into five classes:

- **Carbohydrates** (starches, sugar, and fiber)
- **Proteins** (includes 22 amino acids)
- **Fats** (saturated, monounsaturated, and polyunsaturated fatty acids)
- **Minerals**
- **Vitamins**

These nutrients work together and interact with body chemicals to perform several functions.

- Provide materials to build, repair and maintain body tissues
- Supply substances that function in the regulation of body processes
- Furnish fuel for energy needed by the body

Each nutrient has a certain special job to do in the building, maintenance, and operation of your body. Some jobs require that nutrients work together as a team. These jobs are nutrient-specific. They cannot be done by other nutrients—an extra supply of one nutrient cannot make up for a shortage of another. That's why a balanced diet including all food groups is so necessary. Your body needs all of these nutrients, not just a few. Some nutrients need to be replenished every day from food, while others can be stored in the body for future use.

## The Energy Providing Nutrients

Of the six classes of nutrients, only 3 provide energy: Carbohydrates, Fats and Proteins. Energy is the body's most basic need. Energy is used when you breathe, when the heart pumps blood, and when you sit, stand and walk. The more vigorous the activity, the more energy is required.

The energy contained in a carbohydrate, fat or protein is measured in kilocalories, commonly shortened to "calories" in the United States. The calorie is a measure of energy available to the body. When you eat something, the number of calories it contains is the number of energy units it provides to the body for its needs. The calorie is also a measure of energy your body uses in everyday life or exercise.

## Where the Numbers Come From

A bomb calorimeter is a special instrument used to measure calories in food. The food is first dried to remove water and then placed in a special

Today on SparkPeople

## Today's Feature

11 Low-Cal Halloween Treats  
These Halloween treats are so low in calories that you'll think you're being tricked!



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## Message Board Hot Topics

- Teaching your children healthy eating habits?
- How can I fit extra exercise in?
- What's the LONGEST you've sat at a plateau??
- What are your healthy lifestyle barriers?
- Keep tracking food when you've hit your goal?

## Exercise of the Day



exercise demo

Standing Upright Row on Cable Cross Machine  
Click on the picture to the left to find out more, and see an

## Featured Recipe

Veggie Pizza on Whole Wheat Crust with Feta and Mozzarella Cheeses

Submitted By: **CURVES\_N\_CURLS**

A kickin' vegetarian pizza! Extra-good, 'cause it's made on a whole wheat crust!

[See This Recipe on SparkRecipes](#)

## Activity Stats

Calories Burned: **6,829,696,713**

Pounds Lost: **9,049,226**

Cups Water Drunk: **209,236,654**

SparkAmerica Minutes: **916,341,292**

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container that rests in water. When the food is burned, heat is transferred to the water. The amount the burning food heats the water is the measure of calories. One calorie is the energy needed to raise the temperature of 1 gram of water 1 degree centigrade.

The energy values of the 3 calorie-providing nutrients are as follows:

- 1 gram of carbohydrate = 4 calories
- 1 gram of protein = 4 calories
- 1 gram of fat = 9 calories

Calories may also be added to food intake by consuming alcoholic beverages. Alcohol is not a nutrient because it cannot be used in the body to promote growth, maintenance, or repair. It is a toxin that is broken down as an energy (calorie) source and can be converted to fat.

- 1 gram of alcohol = 7 calories

Nearly all foods supply energy or calories. However, some provide more calories than others. No single food or kind of food is "fattening" by itself. When the energy provided in food is not used – whatever food it is – the excess is stored in the body in the form of fat. Storage of too many excess calories results in being overweight.

[Click here](#) to learn more about the confusing calorie.

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# About.com Sports Medicine

## Sports Nutrition - Protein Needs for Athletes

How much protein do athletes need for strength and endurance

By Elizabeth Quinn, About.com Updated: December 02, 2007

About.com Health's Disease and Condition content is reviewed by the [Medical Review Board](#)

All the energy we need for life as well as for exercise comes from the food we eat and the [fluids](#)<sup>1</sup> we drink. These nutrients are commonly broken into three classes:

- Protein
- [Carbohydrates](#)<sup>2</sup>
- [Fats](#)<sup>3</sup>

Each category of food is important for health and we should all consume foods from each category. The ratios in which we need to consume these foods, however, is often the topic of a debate.

### Sports Nutrition - Protein

Proteins are often called the building blocks of the body. Protein consists of combinations of structures called amino acids that combine in various ways to make muscles, bone, tendons, skin, hair, and other tissues. They serve other functions as well including nutrient transportation and enzyme production. In fact, over 10,000 different proteins are in the body.

Adequate, regular protein intake is essential because it isn't easily stored by the body. Various foods supply protein in varying amounts with complete proteins (those containing 8 essential amino acids) coming mostly from animal products such as meat, fish, and eggs and incomplete protein (lacking one or more essential amino acid) coming from sources like vegetables, fruit and nuts. Vegetarian athletes may have trouble getting adequate protein if they aren't aware of how to combine foods.

#### Learn More:

[Tips for Vegetarian Athletes](#)<sup>4</sup>

### Protein Needs for Athletes

Athletes need protein primarily to repair and rebuild muscle that is broken down during exercise and to help optimize carbohydrate storage in the form of glycogen. Protein isn't an ideal source of fuel for exercise, but can be used when the diet lacks adequate carbohydrate. This is detrimental, though, because if used for fuel, there isn't enough available to repair and rebuild body tissues, including muscle.

### Recommended Daily Protein Intake

- The average adult needs 0.8 grams per kilogram (2.2lbs) of body weight per day.
- Strength training athletes need about 1.4 to 1.8 grams per kilogram (2.2lbs) of body weight per day
- Endurance athletes need about 1.2 to 1.4 grams per kilogram (2.2lbs) of body weight per day

### How Much Protein is That?

Not much, as it turns out. Here is a list of some high protein foods.

**Food, Amount, Protein**

Fish, 3 oz, 21 grams  
 Chicken, 3 oz, 21 grams  
 Turkey, 3 oz, 21 grams  
 Meat, 3 oz, 21 grams  
 Milk, 8 oz, 8 grams  
 Tofu, 3 oz, 15 grams  
 Yogurt, 8 oz, 8 grams  
 Cheese, 3 oz, 21 grams  
 Peanut butter, 2 tbsp, 8 grams  
 Eggs, 2 large, 13 grams

Strength athletes believe more protein is important to build muscle. It turns out that strength athletes actually require high carbohydrate intake and adequate glycogen stores to fuel their workouts. It is the strength training workout that leads to increased muscle mass and strength. This is because all high intensity, powerful muscle contractions (such as weight lifting) are fueled with carbohydrate. Neither fat nor protein can be oxidized rapidly enough to meet the demands of high-intensity exercise. Adequate dietary carbohydrate must be consumed daily to restore glycogen levels.

**Learn More:**

- [Are High Protein Diets Right for Athletes?](#)<sup>5</sup>
- [Carbohydrates for Exercise](#)<sup>6</sup>
- [Should I Eat Carbohydrate or Fat for Exercise?](#)<sup>7</sup>

**Read More:**

- [Energy for Exercise - Fat or Carbs?](#)<sup>8</sup>
- [Eating Before Competing](#)<sup>9</sup>
- [Post-Exercise Meal](#)<sup>10</sup>

Source:

The Position Statement from the Dietitians of Canada, the American Dietetic Association, and the American College of Sports Medicine, *Canadian Journal of Dietetic Practice and Research* in the Winter of 2000, 61(4):176-192.

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# About.com Sports Medicine

## Sports Nutrition - How Carbohydrate Provides Energy for Exercise - Carbs

Why carbohydrates are the best fuel for athletes

By Elizabeth Quinn, About.com Updated: December 02, 2007

About.com Health's Disease and Condition content is reviewed by the [Medical Review Board](#)

All the energy we need for life as well as for exercise comes from the food we eat and the [fluids](#)<sup>1</sup> we drink. These nutrients are commonly broken into three classes:

- Carbohydrates
- [Fats](#)<sup>2</sup>
- [Proteins](#)<sup>3</sup>

Each category of food is important for health and we should all consume foods from each category. The ratios in which we need to consume these foods, however, is often the topic of a debate.

### Sports Nutrition - Carbohydrate - Carbs

Carbohydrate is arguably the most important source of energy for athletes. No matter what sport you play, carbs provide the energy that fuels muscle contractions. Once eaten, carbohydrates breakdown into smaller sugars (glucose, fructose and galactose) that get absorbed and used as energy. Any glucose not needed right away gets stored in the muscles and the liver in the form of glycogen. Once these glycogen stores are filled up, any extra gets stored as fat.

Glycogen is the source of energy most often used for exercise. It is needed for any short, intense bouts of exercise from sprinting to weight lifting because it is immediately accessible. Glycogen also supplies energy during the first few minutes of any sport. During long, slow duration exercise, fat can help fuel activity, but glycogen is still needed to help breakdown the fat into something the muscles can use.

Adequate carbohydrate intake also helps prevent protein from being used as energy. If the body doesn't have enough carbohydrate, protein is broken down to make glucose for energy. Because the primary role of protein is as the building blocks for muscles, bone, skin, hair, and other tissues, relying on protein for energy (by failing to take in adequate carbohydrate) can limit your ability to build and maintain tissues. Additionally, this stresses the kidneys because they have to work harder to eliminate the byproducts of this protein breakdown.

Carbohydrate has other specific functions in the body including fueling the central nervous system (CNS) and brain.

### Storing Carbohydrate

One gram of carbohydrate provides four calories of energy. Athletes often talk about carbohydrate loading and carbohydrate depletion which refers to the amount of carbohydrate energy we can store in our muscles. This is generally around 2,000 carbohydrate calories, but we can change this number through depletion and loading. During depletion (from diet, exercise or a combination) we use up the stored carbohydrate.

If we don't replenish these stores, we can run out of fuel for immediate exercise. Athletes often refer to this as "bonking" or "hitting the wall." In the same way, eating large amounts of carbohydrates can increase these

stores. This is often referred to as carbohydrate loading or carbo-loading. Our maximal carbohydrate storage is approximately 15 grams per kilogram of body weight [15 grams per 2.2 pounds]. So a 175-pound athlete could store up to 1200 grams of carbohydrate [4,800 calories]; enough energy to fuel high intensity exercise for quite some time.

### How Carbohydrate Fuels Exercise

Carbohydrate stored as glycogen is an easily accessible source of energy for exercise. How long this energy supply lasts depends on the length and intensity of exercise and can range anywhere from 30 to 90 minutes or more. To avoid running out of energy during exercise, start with full glycogen stores, replenish them during exercise and refill them after exercise to be ready for the next workout.

### Types of Carbohydrate

Carbohydrates are also divided into simple and complex forms. Simple sugars (carbs) are absorbed and converted to energy very quickly and provide a rapid source of energy. Fruit and energy drinks are a good source of simple carbohydrates.

Complex carbohydrates take a bit longer to be digested and absorbed into the body. They also take longer to breakdown and therefore provide energy at a slower rate than simple sugars. Examples of complex carbohydrates are breads, rice and pasta. Starch and fiber are also considered complex carbohydrates but fiber can not be digested or used for energy. Starch is probably the most important energy source in an athlete's diet because it is broken down and stored as glycogen. Foods high in starch include whole grain breads, cereals, pasta, and grains.

### Read More:

- [Energy for Exercise - Fat or Carbs?](#)<sup>4</sup>
- [Eating Before Competing](#)<sup>5</sup>
- [Post-Exercise Meal](#)<sup>6</sup>

Source:

The Position Statement from the Dietitians of Canada, the American Dietetic Association, and the American College of Sports Medicine, Canadian Journal of Dietetic Practice and Research in the Winter of 2000, 61(4):176-192.

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# About.com Sports Medicine

## Sports Nutrition - How Fat Provides Energy for Exercise

How and why athletes need fat for energy

By Elizabeth Quinn, About.com Updated: October 12, 2007

About.com Health's Disease and Condition content is reviewed by the [Medical Review Board](#)

All the energy we need for life as well as for exercise comes from the food we eat and [fluids](#)<sup>1</sup> we drink. These nutrients are commonly broken into three classes:

- **Fats**
- [Carbohydrates](#)<sup>2</sup>
- [Proteins](#)<sup>3</sup>

Each category of food is important for health and we should all consume foods from each category. The ratio in which we need to consume these foods, however, is often the topic of a debate.

### Sports Nutrition - Fat

Dietary fat is often blamed for many health problems; however, fat is an essential nutrient for optimal health. Adipose tissue (stored fat) provides cushion and insulation to internal organs, covers the nerves, moves vitamins (A, D, E, and K) throughout the body and is the largest reserve of stored energy available for activity. Fat is stored when we consume more calories than we use. There is an [optimal level of body fat](#)<sup>4</sup> for health and for athletic activity. When that optimal level is exceeded, too much dietary fat can lead to problems with health as well as athletic performance.

### Types of Dietary Fat

- **Saturated fats** are found primarily in animal sources like meat, egg yolks, yogurt, cheese, butter, milk. This type of fat is often solid at room temperature. Too much saturated fat has been linked to health problems such as high cholesterol and heart disease. Because of this, saturated fat should be limited to no more than 10% of total daily calorie intake.
- **Unsaturated fats** include monounsaturated and polyunsaturated fats, which are typically found in plant food sources and are usually liquid at room temperature. Unsaturated fats have health benefits such as lowering cholesterol and reducing the risk of heart disease. Common food sources include olive and canola oil, avocados, fish, almonds, soybeans and flaxseed.
- **Trans fat** has recently been added to the nutrition labels of most products. Trans fatty acids are created (naturally or man-made) when an unsaturated fat is made into a solid. Trans fats, like saturated fat, should be limited because they increase cholesterol levels and the risk of heart disease.

### How Fat Provides Energy for Sports

X | Fat provides the highest concentration of energy of all the nutrients. One gram of fat equals nine calories. This calorie density, along with our seemingly unlimited storage capacity for fat, makes fat our largest reserve of energy. One pound of stored fat provides approximately 3,600 calories of energy. While these calories are less accessible to athletes performing quick, intense efforts like sprinting or weight lifting, fat is essential for longer, slower lower intensity and endurance exercise such as easy cycling and walking.

Fat provides the main fuel source for long duration, low to moderate intensity exercise (endurance sports such as marathons, and ultra marathons). Even during high intensity exercise, where carbohydrate is the main fuel source<sup>5</sup>, fat is needed to help access the stored carbohydrate (glycogen).

Using fat for fuel for exercise, however, is dependent upon these important factors:

- Fat is slow to digest and be converted into a usable form of energy (it can take up to 6 hours).
- Converting stored body fat into energy takes time. The body needs to breakdown fat and transport it to the working muscles before it can be used as energy.
- Converting stored body fat into energy takes a great deal of oxygen, so exercise intensity must decrease for this process to occur.

For these reasons, athletes need to carefully time when they eat fat, how much they eat and the type of fat they eat. In general, it's not a great idea to eat fat immediately before or during intense exercise.

### Read More:

- [Energy for Exercise - Fat or Carbohydrate?](#)<sup>6</sup>
- [Eating Before Competing](#)<sup>7</sup>
- [Post-Exercise Meal](#)<sup>8</sup>

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# FITNESS FOR AUSTRALIAN FOOTBALL UMPIRING

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## > WARM-UP PRINCIPLES

A thorough warm-up should be a planned component of every training session. Detailed below are guidelines and principles that are useful in helping plan warm up sessions. You should link the warm-up principles to the skills and running drills you will performing in your training session.

## > PHYSICAL EFFECTS OF WARM-UP EXERCISE

- **Increased muscle temperature** – A warm muscle is much more flexible than a cold one. Increasing muscle temperature can increase range of motion by up to 20%.
- **Increased ventilation and respiration** – Increasing breathing and gas exchange rate provides the body with a ready supply of oxygen to meet its upcoming demands.
- **Redirection of blood to working muscles** – Warm-ups push blood from those areas of the body less-necessary for exercise (such as digestive organs) into the working muscles. Increased blood flow results in a higher temperature, more efficient delivery of fuel and removal of metabolic wastes.
- **Increased perspiration** – The body's primary cooling mechanism is engaged for the upcoming workout.

## > PSYCHOLOGICAL BENEFITS OF WARM-UP EXERCISE

A thorough warm-up work has profound psychological benefits that are often ignored. The warm-up session shifts the umpire mentally from a resting to a working state. It is during this time that the concerns of daily life should fade into the background as focus shifts to the upcoming training. A lack of focus and attention during intense exercise, can result in severe injury.

## > WARM-UP TRAINING, INJURY PREVENTION, AND DOMS

Although there is little experimental evidence showing that warm-ups have a role in injury prevention, the experiences of coaches and athletes provide ample anecdotal support. As previously mentioned, the increased psychological attention and focus resulting from a proper warm up can help prevent workout injuries. A flexible muscle is less likely to be strained or torn during the workout.

## > DOMS (DELAYED ONSET MUSCLE SORENESS)

DOMS is the stiffness, pain, and loss of muscle function that occurs 24 – 48 hours after the workout. It is most pronounced in those who are unaccustomed to training, after workouts that involve substantial eccentric work or novel exercises, or when following changes in training parameters such as intensity or repetition range. Whether or not warming up can actually reduce or prevent DOMS has yet to be substantiated using experimental studies.

WARM UP



# FITNESS FOR AUSTRALIAN FOOTBALL UMPIRING

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## > HOW MUCH WARM-UP

The correct duration of warm-up activity is that which accomplishes the physiological effects listed above without resulting in fatigue that will interfere with the upcoming training session.

In simpler terms, your warm-up should increase your heart rate, breathing rate, body temperature, and mental focus. You should break a good sweat, feel loose, and be ready to go. If you still feel stiff or tight, you haven't done enough, and if you are exhausted, you've done too much. Typically, ten minutes is optimal. However, warm-ups should be tailored to fit the individual and the situation.

Use the following guidelines to determine the appropriate duration:

- Older people typically require more warm-up than younger people. As people age, tissue loses elasticity, arthritis becomes more common, and previous injuries resurface.
- Colder ambient temperatures necessitate longer warm-ups. If it is winter, or you train in a cold environment, spend a bit more time getting ready.
- The more advanced the umpire, the longer the warm-up should be. This is true because more highly trained people typically exercise at higher relative intensities and it takes longer to build up to more intense workloads.

## > WHAT TYPE OF ACTIVITY?

The traditional general warm-up routine consists of five to ten minutes of low intensity cardio. This is typically done on by jogging or completing basic drills at a low intensity. Although such warm-ups are sometimes physiologically adequate, they do not meet the psychological demands of training, nor do they represent the most efficient use of the athlete's time.

## > SPECIFICITY

Optimal warm-ups must closely resemble the target activity on several levels. They must match the workout in terms of intensity and with regard to the muscle groups and movement patterns. Obviously the warm-ups cannot be at the same intensity as the workout because this would result in too much fatigue. However, more intense workout sessions require a longer and more intense warm-up period. This brings the athlete to the proper mental and physical state of readiness. It prepares the body for the upcoming stresses and provides the appropriate amount of psyching up necessary for top effort during training.

Also important is attention to rehab/prehab concerns. Warm-ups must be specific to the individual's body and should take into account previous, current, or potential injuries.

WARM UP



### **Purpose of a Cool Down**

Cooling down is an integral and essential part of every PE lesson.

It is a period of exercise, which helps the body to recover effectively and safely from energetic activity.

By gradually decreasing the level of activity a cool down should.

- prepare the body to stop exercising;
- help to prevent muscle stiffness and soreness;
- lower the breathing and pulse rate to normal levels.

In choosing cool down activities, remember all the children should be active participants.

- Slow down activity levels.
- Choose stretches for the main muscle groups used during a lesson particularly the leg muscles.
- Hold stretches for a slow count of five.

## EXAMPLES OF THE KIND OF COOL DOWN ACTIVITIES SUITABLE TO CONCLUDE CLASS LESSONS

### Cool down 1

- The children jog around the area gradually slowing from a jog to a walk to a slow walk to standing.
- They breath in slowly while stretching the arms out and up and breathe out slowly as the arms are lowered.

### Cool down 2

- The children skip gradually decreasing speed and the length of the skip until the child is skipping on the spot.
- They reduce movement to a walk.
- They all stand still.

### Cool down 3: Whole body stretches

- The children breathe in while stretching wide, breathe out while lowering arms.
- They repeat while stretching high.
- Remind them to breathe in and out slowly.

### Cool down 4

- The children jog around the area gradually slowing from a jog to a walk to a slow walk to standing.
- They make large circles with a variety of body parts while breathing in and out slowly.

### Cool down 5

- The children skip for a lap of the hall/yard, then have a brisk walk for a lap.
- They perform whole body stretches, breathing in and out slowly.
- To finish, they shake out the legs and the arms.

### Cool down 6: The runaway train

- The children line up to form a train and they begin to run. The train goes up a hill and gets slower and slower until it comes to a stop and everyone sinks to the ground.
- The children sit with legs out in front. They stretch to the right and then back, forward and then back, to the left and then back.
- To finish they shake out the legs and arms.

### Cool down 7

- The children are in pairs facing each other.
- Each pair holds hands and side skips for ten steps to the left then the right.
- Then nine, eight, seven, etc. until they stand.
- Claspng wrists they pull against one another and sink down to the ground and then back up again.
- They perform whole body stretches wide, narrow, high, mirroring each others actions.
- Remind the children to breathe in and out slowly

### Cool down 8

- Ask the children to power walk, gradually decreasing the speed until they are almost stopped.
- Ask the children to take ten steps on tippy toes then ten steps on heels.
- They stretch to both sides breathing in as they stretch and out as they release.

### Cool down 9

- The children are in pairs.
- Ask them to shadow their partner as s/he walks briskly in any direction around the area and on a signal reverse roles immediately.
- They gradually slow the speed to a standstill.
- The partners continue to stand one behind the other and they shadow each others' stretching movements remembering to breathe in and out. (The children take it in turn to stretch.)

### Tip to conclude the class

- The children stand or sit with their eyes closed or place a hand over their eyes. The teacher selects one child who tiptoes around the area lightly touching each child in turn. When tipped the child opens the eyes and moves slowly and quietly to the door to line up. If the children are successful in remaining very quiet the last child should not know they are the last one until s/he opens his/her eyes.
- The children sit or lie in a comfortable position breathing in and out slowly with eyes closed. The teacher asks them to:
  - (a) listen to sounds around them;
  - (b) to think about their favourite part of the lesson and to visualise the activity.
 Then conclude as above.



## Reference Guide to Cooling Down

### *An In-Depth Look at the Cool Down*

– By Jen Mueller and Nicole Nichols, Fitness Experts

SparkPeople's Exercise Reference Guides offer an in-depth look at the principles of fitness.

#### What is a Cool Down?

A cool down is the act of gradually lowering body temperature, heart rate, and breathing rate following exercise.

The purpose of cooling down is to slowly return your body to a lower or resting state. When exercise ends abruptly, blood pressure also drops, which could cause dizziness or fainting. A proper cool down prevents the sudden pooling of blood in your extremities and re-circulates blood back to the heart, skeletal muscles and brain. This phase of your workout helps prevent muscle stiffness or soreness too.

You may see conflicting advice as to whether cooling down prevents post-exercise muscle soreness (also known as delayed-onset muscle soreness or DOMS). However, even if cooling down doesn't prevent DOMS, the other benefits of cooling down mean that you should always make it a part of your exercise session.

#### Examples of Cool Down Activities

A cool down can be a slower or lower-intensity version of the activity you just did during your exercise session (like walking after running). The cool down should be gradual. In other words, do not go straight from running full speed to a walking. A light jog in between would be more appropriate so your body can slowly return to normal. The cool down can also be a different activity than you just did, provided it involves the same muscles. Contrary to popular belief, stretching is NOT the same thing as cooling down. In fact, stretching should come after a proper cool down.

#### What are the Benefits of Cooling Down?

A proper cool down provides many benefits. Some of these include:

- \* Helping your heart rate and breathing gradually return to normal
- \* Preventing fainting or dizziness, which can result from blood pooling in the extremities when vigorous activity is stopped suddenly
- \* Preparing your muscles for the next exercise session, which enables you to compete again at the same level within a short period of time (whether it's tomorrow or a few days from now)
- \* Removing waste products (such as lactic acid), which can build up during vigorous activity
- \* Reducing the immediate post-exercise tendency for muscle spasm or cramping
- \* Reduces muscle soreness and stiffness

#### How to Cool Down

When cooling down, keep the FITT Principles (Frequency, Intensity, Time and Type) in mind.

- \* **Frequency:** How often you should cool down  
A proper cool down should be done after any exercise session or physical activity, whether

it is a cardio or strength training workout.

- **Intensity:** How intensely you should cool down

Cool down with a low intensity exercise after a vigorous workout. Continue your chosen exercise (or a different one) while gradually slowing its intensity and/or speed. Gradually slowing down the pace and exertion of your activity over several minutes can seem a natural progression, as well as fulfilling the need to include a cool down at the end of your exercise. Another option is to jog or walk briskly for a few minutes after your exercise, making sure that this activity is lower in intensity than the exercise you have just performed.

- **Time:** How long your cool down should last

A 10 to 15 minute cool down should be sufficient to allow your heart rate and breathing to return to normal. After exercise or strenuous physical activity, it is important to decrease your body temperature gradually until lowers back to normal.

- **Type:** What activities are suitable for cooling down?

See "Examples of Cool Down Activities" above. The cool down can be a lower intensity version of the workout you just did, or it can be a completely different exercise. As long as it slowly lowers your heart rate and breathing, and involves the muscles you just worked, it is considered a proper cool down.

The best time to stretch is after your cool-down, since your muscles are still warm and most likely to respond favorably, and there is a low risk of injury.





**EHS SAFETY TRAINING**

# Back Safety

- Introduction
- Why Do Injuries Occur?
- Causes of Injuries
- How To Avoid Injuries
- Exercises For The Back
- Quiz
- Back to Modules

## How to Prevent Back Injuries

The best way to prevent back injuries is to develop habits that reduce the strain placed on the back. There are some basic things you can do to help.

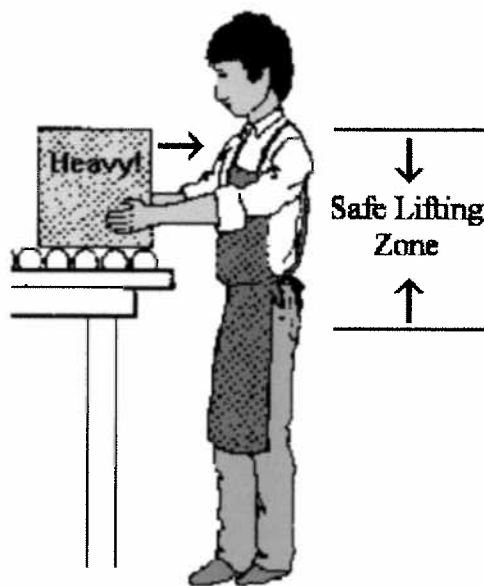
### 1. Avoid Lifting and Bending Whenever You Can

Anytime you can spare your back the stress and strain of lifting and bending, do so! If you don't use your back like a lever, you avoid putting it under so much potentially damaging force.

**Place objects up off the floor.** If you can set something down on a table or other elevated surface instead of on the floor, do it so you won't have to reach down to pick it up again.

**Raise / lower shelves.** The best zone for lifting is between your shoulders and your waist. Put heavier objects on shelves at waist level, lighter objects on lower or higher shelves.

Use carts and dollies to move objects, instead of carrying them yourself.



**Q** Which is better for your back: Pushing a cart or Pulling a cart?

**Use cranes, hoists, lift tables, and other lift-assist devices whenever you can.**

### 2. Use Proper Lifting Procedures

You can't always avoid lifting, but there are ways to reduce the amount of pressure placed on the back when you do so. By bending the knees, you keep your spine in a better alignment, and you essentially take away the lever principle forces. Instead of using your back like a crane, you allow your legs to do the work.

**Follow these steps when lifting:**

1. Take a balanced stance with your feet about a shoulder-width apart. One foot can be behind the object and the other next to it.
2. Squat down to lift the object, but keep your heels off the floor. Get as close to the object as you can.
3. Use your palms (not just your fingers) to get a secure grip on the load. Make sure you'll be able to maintain a hold on the object without switching your grip later.
4. Lift gradually (without jerking) using your leg, abdominal and buttock muscles and keeping the load as close to you as possible. Keep your chin tucked in so as to keep a relatively straight back and neck line.
5. Once you're standing, change directions by pointing your feet in the direction you want to go and turning your whole body. Avoid twisting at your waist while carrying a load.
6. When you put a load down, use these same guidelines in reverse.

**BEND YOUR KNEES****HUG THE LOAD****AVOID TWISTING****Also follow these lifting tips:**

**Reduce the amount of weight lifted.** If you're moving a bunch of books, better to load several small boxes than one extremely heavy load.

**Use handles and lifting straps.**

**Get help** if the shape is too awkward or the object is too heavy for you to lift and move by yourself!

**Body Management**

It's important to know your body's limitations, and it's important to be aware of your body position at all times. Learn to recognize those situations where your back is most at risk: bending, lifting, reaching, twisting, etc. Then take measures to avoid an injury.

**Stretch first** - If you know that you're going to be doing work that might be hard on your back, take the time to stretch your muscles before starting, just like a professional athlete would do before a workout. This will help you avoid painful strains and sprains.

**Slow down** - If you're doing a lot of heavy, repetitive lifting, take it slowly if you can. Allow yourself more recovery time between lifts, as well. Don't overdo it.

**Rest your back** - Take frequent, short (micro) breaks. Stretch. If you've ever been working in an awkward position for a long time, then stood up and felt stiff and sore, you know you've been in that position too long, and your body is now protesting. Taking a one minute stretch break every now and then can help you avoid that.

**Sleep on a firm mattress.** - Also, the best sleeping position for many people is either on the back with the knees slightly elevated (by a pillow), or on the side with knees slightly bent.

**Get in shape** - Strengthen your stomach muscles, lose a little weight, increase your flexibility.

**NEXT**

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[\[Intro\]](#) [\[Why?\]](#) [\[Causes\]](#) [\[Prevention\]](#) [\[Exercises\]](#) [\[Quiz\]](#)

Lifting procedures and cartoons copyright Parlay International

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This lesson idea is from PE Central (pecentral.org), the premier Web site for Physical Education Teachers. *Sponsored by S&S Worldwide (ssww.com)*

**Name/Title:** Shopping at the Lift and Carry Store

**Purpose of Event:** To provide students with the opportunity to practice proper body alignment when lifting, carrying and lowering an object.

**Prerequisites:** Introduction to the correct technique of lifting and lowering an object (i.e., bend knees and use the legs, not the back).

**Suggested Grade Level:** 1-2

**Materials Needed:** 1 milk crate or small box per group; 2 hula hoops per group; a variety of objects to place in hula hoops -- approximately 10-12 of each of the following: balls, rings, dice, rubber chickens, frisbees, poly-spots, wooden and/or plastic bowling pins, small weights, etc.; one "shopping list" per group of two students.

### Description of Idea

Before class, make up "**shopping lists**" by listing different pieces of equipment, in different orders (e.g., not all balls are first on everyone's list) on pieces of paper. Then, spread hula hoops filled with various pieces of equipment: balls, weights, pins, beanbags, etc., around the room. At the other end of the room, place the other hula hoops in a row; put one crate or small box in each hoop.

At the beginning of class, explain and/or review the correct **lifting and lowering technique** (i.e., bend the knees and use the legs, not the back) with students. Then explain and demonstrate and have students participate in the following:

Pair students up. Each group gets one "shopping list", then goes to one hoop with a crate or box in it. The first student in each group will go "**shopping**" by properly bending down, lifting the milk crate from in front of hula hoop, properly carrying it to other end of gym, and properly lowering it down to ground. The student will "**buy**" the first object on his/her group's list by picking it up, place it in the crate, lifting the crate back up, and carrying the crate back to the hula hoop. There, they correctly lower the crate to the ground, take the object out of the crate, and place the "**bought**" object in hoop. The next student then repeats the above steps, shopping for the **second object** on the list. Have students go until all objects are "**bought**" (placed in hoop), then **return** all objects back to hoop one at a time the same way.

**Assessment Ideas:**

Observe students to see if they are correctly using the proper technique for both lifting and lowering.

### Teaching Suggestions:

Shorten the distance between hoops.

Have less objects to "buy".

Instead of emptying the crate each time, allow students to keep adding objects to their crate or box. How many items on their list can they safely carry?

Allow students to "buy" any object, without the use of the "shopping list".

Be sure to use a number of objects of varying weight. Children love the challenge of trying to lift different objects.

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Submitted by Deanna McMullen who teaches at Marshall Elementary in Livonia , MI . Thanks for contributing to PE Central! **Posted on PEC: 8/17/2000**. Printed 1803 times since 8/24/2001.

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# IMMEDIATE EFFECTS OF EXERCISE ON THE BODY

**Lesson Objectives: By the end of the lesson you should:**

- Understand the 5 immediate effects of exercise on the body
- Explain the terms oxygen debt and lactic acid
- Explain what is meant by anaerobic respiration

When we exercise, especially cardiovascular exercise, there are several immediate effects on our bodies. These are as follows:

## **① YOUR HEART BEATS FASTER AND STRONGER**

The rise in pulse rate allows more blood to be pumped to the lungs faster so that more oxygen can be circulated to the working muscles. By beating faster and stronger means that the stroke volume will increase since it is the amount of blood pumped out of the heart in one beat.

## **② YOUR BREATHING QUICKENS AND DEEPENS**

An increase in breathing rate will help us to get more oxygen to the working muscles, but eventually if we work hard enough for long enough we will reach a point where we cannot get enough oxygen (oxygen debt) and our muscles will stop working. The more efficient the body is at getting oxygen into the blood and to the muscles, the longer we can exercise for.

## **③ YOUR BODY TEMPERATURE WILL RISE**

When we exercise our muscles produce heat so our body temperature rises (normal body temperature is about 37°C or 98.8°F). We can control our body temperature by sweating when we are too hot and shivering when we are too cold.

## **④ YOUR START TO SWEAT**

Most energy produced through respiration is used by the muscles but some of it is turned to heat and eventually we begin to sweat. Sweat on the skin will evaporate, but to do this requires energy. It gets this from the body as heat and as it uses this heat our body temperature falls (experiment by licking the back of your hand and blowing on it).

The two problems that are caused by sweating too much is that we can become dehydrated and lose salt. The loss of salt can cause cramps.

## 5 YOUR MUSCLES BEGIN TO ACHE

We have seen that glucose combined with oxygen produce energy, carbon dioxide and water. But as we exercise harder there is a limit to how much oxygen we can get to the muscles. When we cannot get enough oxygen to the muscles this is known as '*oxygen debt*' and so a different way of getting energy is used and this produces '*lactic acid*'. A build up of lactic acid causes the muscle to ache and eventually it will cause cramp and the muscles will stop working.

Producing energy without oxygen is known as '*anaerobic respiration*' and the formula for this is:



The body can get rid of this lactic acid by resting until the blood can bring enough oxygen to the muscles to pay-off the oxygen debt. Oxygen will break down the lactic acid into water and carbon dioxide.

## HOMEWORK

- Look at the 5 immediate effects of exercise and explain how they are likely to be different comparing a trained and untrained athlete.

SHORT TERM EFFECTS OF EXERCISE ON THE BODY.

The body needs much more Oxygen. The breathing becomes faster and deeper and produces a large vol. of Oxygen. More Carbon Dioxide is produced which is the waste product, which blood carries back to the lungs to be exhaled

People taking part in exercise go red because the Veins carrying warm blood back to the heart divert the blood nearer the skins surface. This is called Vasodilation. The heat is then lost through radiation through the skin.



Because the body needs more blood to carry more Oxygen and waste products the blood is diverted from parts of the body that don't require it for example the blood in the stomach is reduced.

The heart beats faster and pumps blood around the body faster. The heart also fills up with more blood and squeezes more blood out with each contraction. The Heart Rate, Stroke Vol., Cardiac Output, and Blood Pressure all increase during exercise.

Other muscles contract and squeeze the veins which helps the blood back to the heart.

Adrenaline is released, which causes the cells to burn up more Oxygen.

More H<sub>2</sub>O and heat are produced and eliminated by sweating and exhaling. The blood must carry these waste products away from the muscle cells, this is why the breath is hot and moist during exercise. Muscles are required to contract and relax in specific areas of the body.

The rib cage, sternum and diaphragm have to work harder expanding and reducing the lungs in order to get O<sub>2</sub> in and CO<sub>2</sub> out. The Breathing Rate, Tidal Vol. and Minute Vol. all increase during exercise.





## Concept of Physical Fitness

By [Elizabeth Stewart](#)

**Article Word Count:** 532 [[View Summary](#)] [Comments \(0\)](#)

Almost everywhere you go today, you are approached with the **concept of physical fitness**. Unfortunately, a large percentage of Americans are considered obese and it has become quite a concern. Due to this epidemic, we now see increased marketing of diets, being physical fit, in addition to, the many health products now being offered. TV, magazines, and radio play a major role in the distribution of why the **concept of physical fitness** is so important.

With all this commotion about fitness, have you joined the team and started your path to total fitness? If not here is a brief description of the standards of physical fitness and what you may do about your current fitness level.

You may want to work out for looking good or for health. Regardless of your motive, most experts agree there are five basic components of fitness.

They are:

- 1) Aerobic Endurance- Your level of aerobic endurance measures your ability to do moderately strenuous activity over a period of time. It's a measurement of how efficiently your heart and lungs work together to supply oxygen to your body during exertion and exercise. This fitness component is also called aerobic fitness.
- 2) Muscular Endurance- Muscular Endurance measures your fitness level by your ability to hold a particular position for a sustained period of time or repeat a movement many times. One example might be to lift a five-pound weight 20 consecutive times.
- 3) Muscular Strength- The ability to exert maximum force. It is possible to have greater muscular strength in one area, than another. For example, you may have great strength in your arms, while lacking strength in your legs. One example might be lifting the heaviest weight you can possibly lift.
- 4) Flexibility- Flexibility fitness measures the ability to move a joint through its full range of motion or the elasticity of the muscle. This is how limber you are.
- 5) Body Composition- This fitness area measures the proportion of fat in your body as compared to your bone and

muscle. It does not refer to your weight in pounds or your shape.

If you are weak in any area or need to begin a general overall fitness plan, there are basically three areas of exercise you should concentrate upon to make improvements. They are stretching, aerobic activity, and strength training. Each of these areas is very important to your overall fitness level.

Eating a healthy diet will also contribute greatly to your overall fitness level. If you are going to take the time to work out, you need to refuel your body with healthy foods.

Remember, it is never too late to improve your fitness level.

Regardless of your physical fitness level, your age, or the length of time it has been since you last exercised regularly, it's never too late to start and maintain a good fitness routine.

Always start simple and work your way up and don't forget it takes at least 21 days to create a habit.

Your body is designed to move. It is just that simple; you only get one body. If you don't use it, you lose it. That's why the **concept of physical fitness** is so important.

To find out why Low Carb, Low Calorie, and Low Fat diets don't work, read more information on **The Idiot Proof Diet**

Article Source: [http://EzineArticles.com/?expert=Elizabeth\\_Stewart](http://EzineArticles.com/?expert=Elizabeth_Stewart)

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# About.com Sports Medicine

## Exercise Science - The Science Behind Your Workout

How to Get the Most From Your Workout

By Elizabeth Quinn, About.com Updated: July 31, 2008


About.com Health's Disease and Condition content is reviewed by the [Medical Review Board](#)

In the study of exercise science, there are several universally accepted scientific fitness principles that must be followed in order to get the most from exercise programs and improve both physical fitness and sports performance. These principles behind the development of exercise programs include:

### 1. The Principle Of Individual Differences

The principle of individual differences simple means that, because we all are unique individuals, we will all have a slightly different response to an exercise program. This is another way of saying that "one size does not fit all" when it comes to exercise. Well-designed exercise programs should be based on our individual differences and responses to exercise.

Some of these differences have to do with body size and shape, genetics, past experience, chronic conditions, injuries and even gender. For example, women generally need more recovery time than men, and older athletes generally need more recovery time than younger athletes.




With this in mind, you may or may not want to follow an "off the shelf" exercise program, DVD or class and may find it helpful to work with a coach or personal trainer to develop a customized exercise program. Some things to consider when creating your own exercise program include the next batch of exercise science principles.

### 2. The Principle of Overload

The exercise science principle of overload states that a greater than normal stress or load on the body is required for training adaptation to take place. What this means is that in order to improve our fitness, strength or endurance, we need to increase the workload accordingly.

In order for a muscle (including the heart) to increase strength, it must be gradually stressed by working against a load greater than it is used to. To increase endurance, muscles must work for a longer period of time than they are used to or at a higher intensity.

### 3. The Principle of Progression



The principle of progression implies that there is an optimal level of overload that should be achieved, and an optimal time frame for this overload to occur. A gradual and systematic increase of the workload over a period of time will result in improvements in fitness without risk of injury. If overload occurs too slowly, improvement is unlikely, but overload that is increased too rapidly may result in injury or muscle damage. For example, the weekend athlete who exercises vigorously only on weekends violates the principle of progression and most likely will not see obvious fitness gains.

The Principle of Progression also stresses the need for proper rest and recovery<sup>1</sup>. Continual stress on the body and constant overload will result in exhaustion and injury. You should not train hard all the time, as you'll risk overtraining<sup>2</sup> and a decrease in fitness.

#### 4. The Principle of Adaptation

Adaptation refers to the body's ability to adjust to increased or decreased physical demands. It is also one way we learn to coordinate muscle movement and develop sports-specific skills, such as batting, swimming freestyle or shooting free throws. Repeatedly practicing a skill or activity makes it second-nature and easier to perform. Adaptation explains why beginning exercisers are often sore after starting a new routine, but after doing the same exercise for weeks and months they have little, if any, muscle soreness.

Additionally, it makes an athlete very efficient and allows him to expend less energy doing the same movements. This reinforces the need to vary a workout routine if you want to see continued improvement.

#### 5. The Principle of Use/Disuse

The Principle of Use/Disuse implies that when it comes to fitness, you "use it or lose it." This simply means that your muscles hypertrophy<sup>3</sup> with use and atrophy<sup>4</sup> with disuse. This also explains why we decondition<sup>5</sup> or lose fitness when we stop exercise.

#### 6. The Principle of Specificity

The Specificity Principle simply states that exercising a certain body part or component of the body primarily develops that part. The Principle of Specificity implies that, to become better at a particular exercise or skill, you must perform that exercise or skill. A runner should train by running, a swimmer by swimming and a cyclist by cycling. While it's helpful to have a good base of fitness and to do general conditioning routines, if you want to be better at your sport, you need to train specifically for that sport.

Many coaches and trainers will add additional guidelines and principles to this list. However, these six basics are the cornerstones of all other effective training methods. These cover all major aspects of a solid foundation of athletic training.

Designing a program that adheres to all of these guidelines can be challenging, so it's not a surprise that many athletes turn to a coach or trainer for help with the details so they can focus on the workouts.

#### Learn more

- [Do You Need a Personal Trainer?](#)<sup>6</sup>
- [Tips for More Effective Training](#)<sup>7</sup>
- [The Benefits of Cross Training](#)<sup>8</sup>
- [What Causes Muscle Fatigue](#)<sup>9</sup>

Source

Wilmore, J.H. and Costill, D.L. Physiology of Sport and Exercise: 3rd Edition. 2005. Human Kinetics Publishing.

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9. <http://sportsmedicine.about.com/od/anatomyandphysiology/a/musclefatigue.htm>

## Why Children Have Special Fluid Needs

By Suzanne Nelson, Sc.D., RD

While the most important part of any athlete's diet is fluids, the type, amount, timing, and even temperature of fluids consumed by a preadolescent child before, during, and after exercise play an especially critical role in maintaining the health and optimal performance of your child athlete because they react differently to exercise and heat differently than adults, or even teenagers.

Children are at increased risk of dehydration and heat-related illness because they:

1. Sweat at a lower rate (both in absolute terms and per sweat gland)
2. Tolerate temperature extremes less efficiently
3. Get hotter during exercise
4. Have more skin surface for their body weight (that results in excessive heat gain in extreme heat and heat loss in extreme cold)
5. Have hearts that pump less blood; and
6. Adjust more slowly to exercising in the heat (a child may require five or six sessions to achieve the same degree of acclimatization acquired by an adult in two or three sessions in the same environment).

**As a result, parents, trainers and coaches need to:**

1. **Educate youth athletes about the importance of hydration and the dangers of heat-related illness**
2. **Take precautions to minimize the risk of heat illness; and**
3. **Ensure that they drink enough fluids before, during and after sports.**

**Here are the key points to keep in mind in making sure your child gets adequate fluids while playing sports:**

- **Kids should drink before, during and after** prevent dehydration, or, worse yet, heat you should encourage your child to drink cool before, during, and after physical activity.
- **Kids should drink on a schedule, not thirsty.** Your child need to regulate his intake by drinking according to a rather than in response to thirst, because not an accurate measure of a child's need **By the time your child says he is thirsty, *already* dehydrated.** Consuming cool regular intervals during exercise protects child's health and optimizes athletic performance.\*
- **Kids should drink from their own water bottles.** Children should have their own personalized water bottles and need to be reminded to drink 5 to 9 ounces (10 to 18 1/2 ounce "gulps") every 20 minutes during activity, depending on weight (Teenagers should drink more). Younger children should be given water bottles with marks on the sides showing how much they should drink each time or told how many "gulps" to drink.
- **Kids' fluid intake needs to be supervised.** Children do not instinctively drink enough fluids to replace water losses, so it is essential that you watch to see how much water they actually drink.
- **Kids need to be watched for signs of heat illness.** During prolonged exercise, children and adolescents may not recognize the symptoms of heat strain and may push themselves to the point of heat-related illness. It's your job, and the coach's, to recognize the warning signs and act immediately



sports. To  
illness,  
fluids

when  
fluid  
schedule,  
thirst is  
for fluid.  
he is  
fluids at  
your

## Choosing the right fluids

- **Sports Drinks Are Best.** The best source of fluid to hydrate the body is a sports drink. Your child will be more likely to drink the fluids she needs if you give her a flavored sports drink that tastes good and stimulates thirst. While sports drinks are absorbed just as quickly, and promote optimal cardiovascular function and temperature regulation as well as plain water, they offer the following advantages:
  - Sports drinks contain glucose and sodium, which increase the rate of fluid absorption by the small intestine;
  - By providing carbohydrates for working muscles, sports drinks improve performance during both prolonged exercise (lasting an hour or more) and when exercising for an hour several times a day; and
  - They encourage drinking by "turning on" the thirst mechanism (research has shown that children stay better hydrated when drinking sports drinks compared to plain water).

For optimal absorption and performance, look for sports drinks that contain:

- 4 to 8% carbohydrate (10 to 18 grams per 8 ounces)
- About 36 to 77 calories per 8 ounces.

Because most sports drinks contain 5 to 8% carbohydrates, it's a matter of personal preference: have your child try several sports drinks to find the one that works best for her. Note, however, that research has shown that children and those in early adolescence prefer *grape-flavored* sports drinks to apple or orange.

- **Avoid sugary or carbonated beverages.** Beverages that contain more than 10% carbohydrate (about 96 or more calories per 8 ounces), such as fruit juices, or are high in fructose, like carbonated soft drinks, should be avoided. They are absorbed more slowly and can cause stomach cramps, nausea, bloating and diarrhea.
- **Avoid caffeinated beverages.** Children should avoid drinking ice tea or soft drinks containing caffeine because they are diuretics (promote urination), and because the potential side effects - agitation, nausea, muscle tremors, palpitations and headaches - work against peak athletic performance.

\* **Note to parents of water and winter sport athletes.** Don't be lulled into thinking your child doesn't have as great a need to replace fluids as other athletes. A swimmer still loses body water through sweat in the pool, and can become dehydrated by sitting on the pool deck (a hot, humid environment) between exercise sessions or during a long meet (they always are!). Winter sports athletes (figure skaters, hockey players, skiers) also may not realize the importance of fluid replacement because they practice and play in a cool or cold environment, and because their clothing and equipment reduces the ability of the body to cool itself.

[Physical Fitness](#)

# FITT

[Training](#)

[F.I.T.T.](#)

[Warm-up](#)

[Cool-down](#)

[Cardio-Vascular Endurance](#)

[Cardio-Vascular Training](#)

[Cardio-Vascular Testing](#)


[Lesson Plans](#)  
[Resources](#)

The acronym FITT is the formula used to establish "prescriptions" for individual needs and goals when developing Cardio - Vascular Endurance. It is an extension of the Overload Principle

It is similar to the type of information that doctors use when prescribing medicines

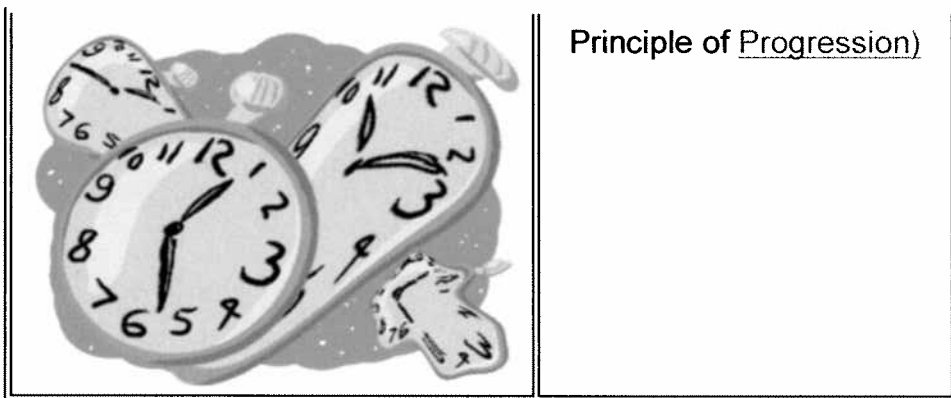
eg. Take 1 pill(Intensity) called "cure"(Type), twice a day(Frequency), for two weeks(Time).

<b>FREQUENCY:</b>	<b>How often do you exercise?</b>
In order to improve C.V. endurance one needs to implement a regular programme of aerobic training on a regular basis. Initially 3 - 4 times a week is recommended thereby balancing the Principles of <u>Recuperation</u> and <u>Progression</u> .	

<b>INTENSITY:</b>	<b>The difficulty of the exercise</b>
	There is a range within which the heart needs to work to best develop C.V. endurance. This is called the <u>Target Training Zone</u>

<b>TIME:</b>	<b>The duration of the exercise.</b>
	Initially, this should be at least 20 mins. Then increase the duration as one increases their endurance levels. (See





Principle of Progression)

<p><b>TYPE:</b></p>	<p>The activity must be specific to the desired fitness component</p>
	<p>The type of training activity must be <u>specific</u> to or closely related to the intended activity. One should try to vary the activity to keep it interesting and motivating.</p> <p>Aerobic type activities include any activity where the individual works at a steady, continuous pace for a long period of time eg. walking, cycling, jogging, aerobics etc. Popular methods of training include - interval, continuous and Fartlek training.</p>

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# ACTIVITY 2A: STUDENT WORKSHEET

## CLASSIFYING FOODS

1. Place the following foods in the correct food group.

Pinto beans	Macaroni	Zucchini	Spaghetti	Meatballs
Tomatoes	Oatmeal	Broccoli	Pickle	Mushrooms
Watermelon	Corn	Rice	Toast	American cheese
Saltine crackers	Carrots	Pancake	Grapes	Orange juice
Peanut butter	Yogurt	Sausage	Chicken	Vegetable soup
Hamburger patty	Potato	Tortilla	Raisins	Green beans
Cauliflower	Apple	Biscuit	Muffin	Tuna fish
Raisin bran	Squash	Catfish	Egg	Cornbread
Cucumber	Ham	Spinach	Banana	Hot dog
Noodles	Milk	Shrimp	Strawberry	Swiss cheese

Bread Group

Fruit Group

Vegetable Group

Protein Group

Dairy Group

Breads, cereals, rice, and pasta	Fruits	Vegetables	Meat, poultry, fish, dry beans, eggs, and nuts	Milk, cheese, and yogurt

2. Add one food to each group which is not on the list.

3. Circle your favorite food in each group.

# ACTIVITY 2A: TEACHER ANSWER KEY

## CLASSIFYING FOODS

1. Place the following foods in the correct food group.

Pinto beans	Macaroni	Zucchini	Spaghetti	Meatballs
Tomatoes	Oatmeal	Broccoli	Pickle	Mushrooms
Watermelon	Corn	Rice	Toast	American cheese
Saltine crackers	Carrots	Pancake	Grapes	Orange juice
Peanut butter	Yogurt	Sausage	Chicken	Vegetable soup
Hamburger patty	Potato	Tortilla	Raisins	Green beans
Cauliflower	Apple	Biscuit	Muffin	Tuna fish
Raisin bran	Squash	Catfish	Egg	Cornbread
Cucumber	Ham	Spinach	Banana	Hot dog
Noodles	Milk	Shrimp	Strawberry	Swiss cheese

Bread Group      Fruit Group      Vegetable Group      Protein Group      Dairy Group

Breads, cereals, rice, and pasta	Fruits	Vegetables	Meat, poultry, fish, dry beans, eggs, and nuts	Milk, cheese, and yogurt
Saltines crackers Raisin bran Noodles Macaroni Oatmeal Rice Pancake Tortilla Biscuit Spaghetti Toast Muffin Cornbread	Watermelon Apple Grapes Raisins Banana Strawberry Orange juice	Tomatoes* Cauliflower Cucumber Corn Carrots Potato Squash Zucchini Broccoli Spinach Pickle* Mushroom Vegetable soup Green Beans	Pinto beans Peanut butter Hamburger patty Ham Sausage Catfish Shrimp Chicken Egg Meatballs Tuna fish Hot dog	Yogurt Milk American cheese Swiss cheese

\*These foods may be classified as fruits.

- Add one food to each group which is not on the list.
- Circle your favorite food in each group.



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## Aerobic exercise: How to warm up and cool down

By Mayo Clinic staff

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**Original Article:** <http://www.mayoclinic.com/health/exercise/SM00067>

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## Aerobic exercise: How to warm up and cool down

**Easing into and out of your aerobic workout may be as important as the exercise itself. Here's how to warm up and cool down safely.**

By Mayo Clinic staff

You're ready to get fit. You can't wait to feel better and have more energy to do all the things you enjoy. But jumping into an aerobic workout without preparing your body could lead to setbacks, such as muscle strain or injury. To help your body adapt to the demands of aerobic activity, take time to warm up before you exercise and cool down afterward.

### How to warm up

Warming up prepares your body for aerobic activity. It gradually revs up your cardiovascular system, increases blood flow to your muscles and raises your body temperature.

Choose a warm-up activity that uses the same muscles you'll use during your workout. For example, if you're going to take a brisk 30-minute walk, walk slowly for five to 10 minutes to warm up.

If you have a tight or previously injured muscle, stretch the affected muscle after you warm up. Hold each stretch for about 30 seconds. And remember to keep it gentle. Don't bounce. Sudden or aggressive movements may cause injury.

## How to cool down

Immediately after your workout, take time to cool down. This gradually reduces the temperature of your muscles and may help reduce muscle injury, stiffness and soreness.

Cooling down is similar to warming up. After your workout, walk or continue your activity at a low intensity for five to 10 minutes. For example, after a 30-minute session of brisk walking, cool down by slowing your walking pace for five to 10 minutes.

## Remember to stretch

After you cool down, your muscles will be warm and receptive to stretching. Regular stretching increases your flexibility, improves circulation and helps maximize the range of motion of your joints.

Focus on your calves, thighs, hips, lower back, neck and shoulders — or other muscles and joints that you routinely use at work or play. Hold each stretch for about 30 seconds, and then repeat the stretch on the other side. Expect to feel tension while you're stretching. If it hurts, back off to the point where you don't feel any pain. Relax and breathe freely throughout each stretch.

## Be kind to your body

Finding time for regular aerobic workouts can be challenging. If you're tempted to skip warming up and cooling down, get creative. If you walk to a fitness facility, use the trip there and back to warm up and cool down. Remember, the time you spend preparing for exercise and cooling down afterward may be as important as the exercise itself. Give your body the time it needs to adjust to the demands of your workout.

## References

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March 20, 2009

SM00067

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# LESSON 1: STUDENT HANDOUT

## YOU ARE WHAT YOU EAT

You are what you eat. What does this mean? If you eat only celery, will you become a vegetable? Sometimes there are so many words used to describe foods and nutrition, it is difficult to make sense of them. In fact, we do use the food we eat to provide energy and also the building blocks for growth and development. Even after you are fully grown, your body, just like any other machine, needs to make constant repairs to injured areas and must replace cells that have died. To make sure that the structure of your body is correct and strong, you must provide it a regular supply of the right building materials. Foods are the building materials for the body.

There are six large categories of nutrients in food. These are carbohydrates, protein, fats, vitamins, minerals, and water. Each food you eat not only contains more than one nutrient, but also a different number of calories (*energy*). Fat, protein, and carbohydrates provide calories, or energy as well as building blocks. Vitamins, minerals and water are chemicals that are essential to the body's chemical machinery, but are not really sources of calories. Fiber is another important part of a balanced diet and a healthy digestive tract. It is not labeled a nutrient, however, since it is not digestible but remains in your digestive tract.

### CARBOHYDRATES

Carbohydrates are sugars and starches. These substances are used by your body to create energy. After being eaten, they are broken down into glucose or sugars that are used as fuel. Carbohydrates are often described as simple or complex. Simple sugars are carbohydrates that are made up of only one or two molecules of glucose (*sugar*.) Simple sugars are found in foods like candies, soft drinks, fruit juices, and fruit. Complex carbohydrates are found in starchy foods like rice, potatoes, tortillas, and bread. Other foods which contain carbohydrates include carrots, corn, and bananas. These complex carbohydrates are made up of many, many molecules of sugar which are bound together.

Although simple sugars and complex carbohydrates are made up of similar molecules, they have different amounts of nutrition. Grains (*rice and wheat*), bananas, carrots, and corn also contain important vitamins, such as Vitamin A, and fiber. Fiber, often referred to as bulk, is the part of the food which cannot be digested. Fiber is important for digestive function, but also helps remove toxic substances and excess cholesterol. Simple sugars from foods that do not contain other nutrients, like candies or soft drinks, also provide energy, but do not meet any of your body's other nutritional needs.

### PROTEINS

Proteins are a major component of most tissues including muscles, bodily organs, and cells. Body protein is made from building blocks of amino acids. The human body can make most amino acids and use them to build proteins. However, nine amino acids, called the essential amino acids, cannot be made by the human body. They have to be eaten on a regular basis for your body to maintain itself. Animal sources of protein like meat, fish, dairy products, and eggs contain all nine essential amino acids.

They are often referred to as complete protein. Vegetable or plant sources of protein like beans, nuts, and some grains do not have all nine essential amino acids. Fortunately, plant proteins can be mixed so that all essential amino acids are present in one meal. When beans and corn (*like corn tortillas*) are combined; all the essential amino acids are present. The same is true when beans and wheat, beans and rice, or nuts and wheat are mixed together. So, it is possible to have a completely healthy diet without eating meat. In order to have complete protein with each meal, it is important to get the right mix of vegetable proteins.

Animal and plant sources of protein also contain different amounts of other nutrient classes. Animal protein usually contains a relatively high amount of fat and very little fiber. Plant sources of protein have very little fat and a relatively large amount of fiber. Since fiber is very important in the diet and excess fat can contribute to having heart disease, it may be healthiest to eat small amounts of animal protein in combination with plant proteins. It is also possible to avoid fat by choosing skim or low-fat milk, low-fat cheese or lean meat.

## **FATS**

Fats are also necessary for health. Fat is a component of all cell membranes, and is an important source of stored energy in your body. When you can't avoid skipping a meal, your body uses fat for energy. Unfortunately, the body requires protein at the same time and will use tissue, like muscle to feed itself. Fat in the digestive tract helps your body absorb the fat soluble vitamins. Although fats are important, not all fats are as healthy for you as others. Eating too much saturated fat can increase your cholesterol and raise your risk of heart disease. Saturated fats come from meat, dairy products, and some kinds of vegetable oils called tropical oils (*palm and coconut*). Unsaturated fats do not have as great an effect on cholesterol and do not increase the risk of heart disease as much. These fats are found in fish and in vegetable oils like olive, peanut, and corn oil. In general, it is a good practice to have most of your fat calories come from unsaturated fat. This means eating leaner meat, skim or low-fat milk, and avoiding fried foods. If food has to be cooked with oil, use peanut or corn oil instead of lard.

## **VITAMINS**

Vitamins are important for the cellular machinery of your body. They are chemical substances that help the body use energy, build proteins, make cells, and repair injuries. Vitamins are divided into two general categories: fat soluble and water soluble. The fat soluble vitamins are A, D, and E. Vitamin A is necessary for eyes, bones, and skin. Vitamin D is necessary to make bones, teeth, and allows your body to use the calcium that you eat. Vitamin E is important for healing wounds and to fight against bodily toxins. The water soluble vitamins are Vitamin C and the B vitamins. Vitamin C is important for fighting infection and for using the stored energy in your body. It is generally found in citrus fruits and other vegetables like tomatoes and peppers. The B vitamins are important for building blood cells, nerve cells, and are vital for many of your body's chemical reactions. These are present in many meats and vegetables.

The amount of vitamins that are recommended on a daily basis are called recommended daily allowances. In general, a balanced diet can provide all the vitamins you

need without having to take vitamin supplements. If you have questions about the whether the food you eat contains the right amount of vitamins, it is useful to carefully examine food labels. Labels will tell you the proportion of the daily allowance present in prepared food. Fresh food, however, generally has a higher vitamin content than already prepared food. Some foods, like specially labeled cereals, are supplemented with vitamins so that you can be sure you are getting what you need.

## **MINERALS**

Minerals are also essential building blocks for your body, but do not provide calories or energy. The foods containing essential minerals also contain other energy supplying material. Milk, for example, is an important source of calcium, Vitamin D, and protein. Calcium is the primary chemical component of bones and teeth. Iron is used in red blood cells to transport oxygen. Potassium and sodium are electrically charged chemicals that govern the electrical connections between body tissues. Other minerals are important to assist in other vital chemical reactions. Zinc, manganese, and selenium are essential for development of cells, healing, and all the body's immune reactions.

As with vitamins, most persons who eat a balanced diet will get an adequate supply of minerals without having to use supplements. Many people, especially African Americans, may have problems digesting milk and dairy products, our major source of calcium. If you cannot digest milk products, it is important to find a substitute for calcium. Bones cannot become strong without calcium. Having strong bones in old age is dependent on the strength of your bones when you are young. Other sources of calcium include dark green leafy vegetables like spinach and broccoli. Recently, some food producers have recognized the importance of calcium and have begun to add calcium to orange juice and other drinks. If you are concerned about your intake of calcium, you might want to choose these calcium enriched products over those that are not supplemented.

## **WATER**

Water is essential for life. It is the single largest component of your body. Each and every day, you use water to metabolize your food, lose heat through sweating, and remove toxins in the urine. On average, an adult uses about 2 to 3 quarts a day just for perspiration and urination. In hot temperatures, with heavy exercise or with fever, your body requires more water than on a typical day. Without the right amount of water, your body cannot maintain the right temperature, blood pressure, or kidney function. Water is also the principal component of many foods, like milk, fruits, and vegetables. Other sources of water include juices and flavored soft drinks. Like the other foods among you must choose, the sources of water in your diet contain other nutrients. Water by itself is the best thirst quencher. In addition to water, fruits and vegetables also contain vitamins and fiber. Low-fat milk contains Vitamin D and calcium. Soft drinks contain large amounts of simple sugars (*and calories*) mixed with water, but no other nutrients. It is important to choose sources of water that will keep you well hydrated (*correct fluid balance*) contribute other nutrients, but not contribute too many calories or fat.



## ACTIVITY 3B: STUDENT HANDOUT

### A PATTERN FOR DAILY FOOD CHOICES

FOOD GROUP	SUGGESTED DAILY SERVINGS	WHAT COUNTS AS A SERVING
<b>Breads, Cereals, and Other Grain Products</b> Whole-grain Enriched	6–11 servings from entire group. Include several servings of whole-grain products daily.	<ul style="list-style-type: none"> <li>• 1 slice of bread</li> <li>• 1/2 hamburger bun or English muffin a small roll, biscuit, or muffin</li> <li>• 3–4 small or 2 large crackers</li> <li>• 1/2 cup cooked cereal, rice, or pasta</li> <li>• 1 ounce of ready-to-eat breakfast cereal</li> <li>• 1 pita pocket (<i>1/2 of the double round</i>)</li> <li>• 1/2 bagel</li> </ul>
<b>Fruits</b> Citrus, melon, berries. Other fruits	2–4 servings from entire group.	<ul style="list-style-type: none"> <li>• a whole fruit such as a medium apple, banana, or orange</li> <li>• a grapefruit half</li> <li>• a melon wedge</li> <li>• 3/4 cup of juice</li> <li>• 1/2 cup of berries</li> <li>• 1/2 cup cooked or canned fruit</li> <li>• 1/4 cup dried fruit</li> </ul>
<b>Vegetables</b> Dark-green leafy Deep-yellow Dried beans and peas ( <i>legumes</i> ) Starchy Other vegetables	3–5 servings from entire group. Include all types regularly; use dark-green leafy vegetables and dried beans and peas several times a week.	<ul style="list-style-type: none"> <li>• 1/2 cup of cooked vegetables</li> <li>• 1/2 cup of chopped raw vegetables</li> <li>• 1 cup of leafy raw vegetables, such as lettuce or spinach</li> </ul>
<b>Meat, Poultry, Fish, and alternatives</b> ( <i>eggs, dried beans and peas, nuts, and seeds</i> )	2–3 servings from entire group.	<ul style="list-style-type: none"> <li>• Serving size may vary, but daily amounts should total 5 to 7 ounces of cooked lean meat, poultry, or fish. Count 1 egg, 1/2 cup cooked beans, or 2 tablespoons peanut butter as 1 ounce of meat.</li> </ul>
<b>Milk, Cheese, and Yogurt</b>	2 servings from entire group 3 servings for women who are pregnant or breastfeeding and for teens; 4 servings for teens who are pregnant or breastfeeding.	<ul style="list-style-type: none"> <li>• 1 cup of milk</li> <li>• 8 ounces of yogurt</li> <li>• 1 1/2 ounces of natural cheese</li> <li>• 2 ounces of processed cheese</li> </ul>
<b>Fats, Sweets, and Alcoholic Beverages</b>	Avoid too many fats and sweets. If you drink alcoholic beverages, do so in moderation.	

Source: U. S. Department of Agriculture

# ACTIVITY 5A: STUDENT HANDOUT

## THE FOOD GUIDE PYRAMID

### A GUIDE TO DAILY FOOD CHOICES

#### Key

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

These symbols show fat and added sugars in foods. They come mostly from the fats, oils, and sweets group. But foods in other groups—such as cheese or ice cream from the milk group or french fries from the vegetable group—can also provide fat and added sugars.

Fats, Oils, & Sweets  
USE SPARINGLY

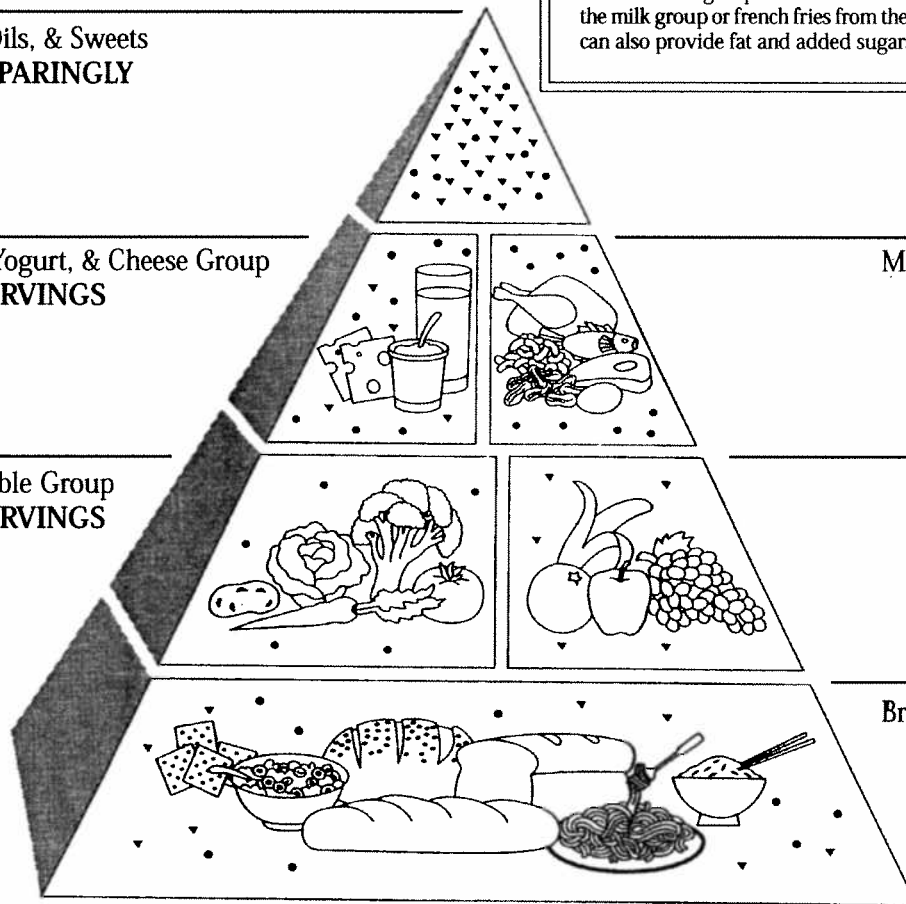
Milk, Yogurt, & Cheese Group  
2-3 SERVINGS

Meat, Poultry, Fish,  
Dry Beans, Eggs,  
& Nuts Group  
2-3 SERVINGS

Vegetable Group  
3-5 SERVINGS

Fruit Group  
2-4 SERVINGS

Bread, Cereal, Rice,  
& Pasta Group  
6-11 SERVINGS



# A Close Look at MyPyramid For Kids

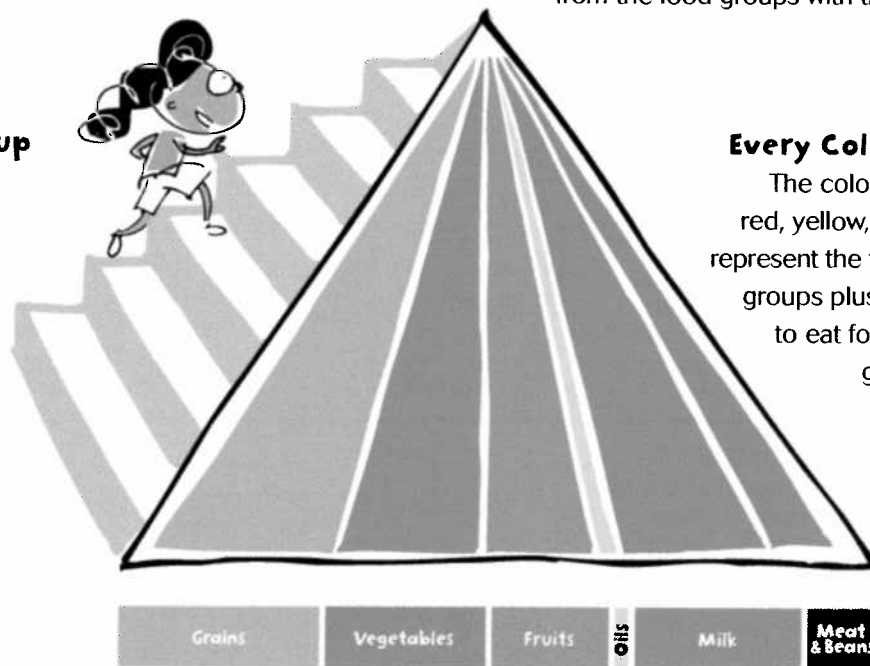
*MyPyramid for Kids* reminds you to be physically active every day, or most days, and to make healthy food choices. Every part of the new symbol has a message for you. Can you figure it out?

## Be Physically Active Every Day

The person climbing the stairs reminds you to do something active every day, like running, walking the dog, playing, swimming, biking, or climbing lots of stairs.

## Choose Healthier Foods From Each Group

Why are the colored stripes wider at the bottom of the pyramid? Every food group has foods that you should eat more often than others; these foods are at the bottom of the pyramid.



## Eat More From Some Food Groups Than Others

Did you notice that some of the color stripes are wider than others? The different sizes remind you to choose more foods from the food groups with the widest stripes.

## Every Color Every Day

The colors orange, green, red, yellow, blue, and purple represent the five different food groups plus oils. Remember to eat foods from all food groups every day.

## Make Choices That Are Right for You

*MyPyramid.gov* is a Web site that will give everyone in the family personal ideas on how to eat better and exercise more.

## Take One Step at a Time

You do not need to change overnight what you eat and how you exercise. Just start with one new, good thing, and add a new one every day.



U.S. Department of Agriculture  
Food and Nutrition Service  
September 2005  
FNS-388



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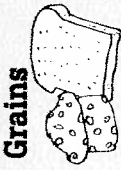


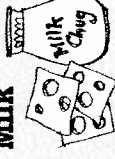


# MyPyramid Worksheet

# MyPyramid

## FOR KIDS

Name: \_\_\_\_\_

Check how you did yesterday and set a goal to aim for tomorrow

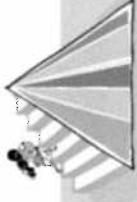
Write In Your Choices From Yesterday	Food and Activity	Tip	Goal (Based On a 1800 Calorie Pattern)	List Each Food Choice In Its Food Group*	Estimate Your Total
Breakfast:	<b>Grains</b> 	Make at least half your grains whole grains.	<b>6 ounce equivalents</b> (1 ounce equivalent is about 1 slice bread, 1 cup dry cereal, or 1/2 cup cooked rice, pasta, or cereal)		_____ ounce equivalents
Lunch:	<b>Vegetables</b> 	Color your plate with all kinds of great tasting veggies.	<b>2 1/2 cups</b> (Choose from dark green, orange, starchy, dry beans and peas, or other veggies).		_____ cups
Snack:	<b>Fruits</b> 	Make most choices fruit, not juice.	<b>1 1/2 cups</b>		_____ cups
Dinner:	<b>Milk</b> 	Choose fat-free or lowfat most often.	<b>3 cups</b> (1 cup yogurt or 1 1/2 ounces cheese = 1 cup milk)		_____ cups
	<b>Meat and Beans</b> 	Choose lean meat and chicken or turkey. Vary your choices—more fish, beans, peas, nuts, and seeds.	<b>5 ounce equivalents</b> (1 ounce equivalent is 1 ounce meat, chicken or turkey, or fish, 1 egg, 1 T. peanut butter, 1/2 ounce nuts, or 1/4 cup dry beans)		_____ ounce equivalents
Physical activity:	<b>Physical Activity</b> 	Build more physical activity into your daily routine at home and school.	At least <b>60 minutes</b> of moderate to vigorous activity a day or most days.		_____ minutes

How did you do yesterday?  Great  So-So  Not So Great

My food goal for tomorrow is: \_\_\_\_\_

My activity goal for tomorrow is: \_\_\_\_\_

\* Some foods don't fit into any group. These "extras" may be mainly fat or sugar—limit your intake of these.

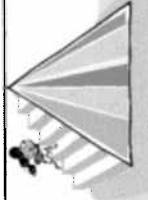
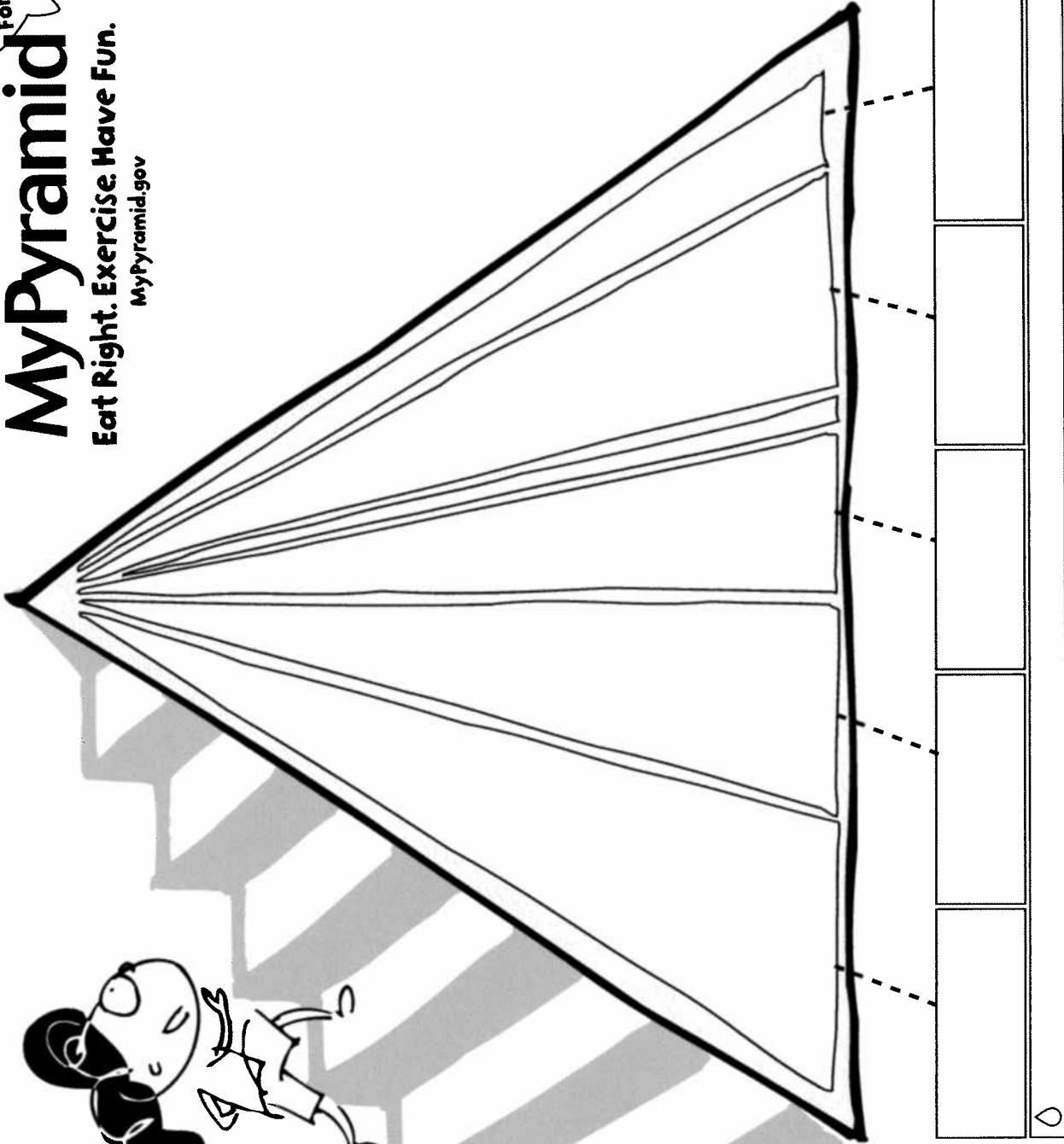




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## Dehydration in sport: why it is vital an athlete maintains hydration levels during exercise

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### How to prevent dehydration from seriously damage your performance

Many athletes dehydrate during competitive events, especially long ones, even when it's not particularly hot. You can't rely on feeling thirsty as a reminder to replace fluid lost through sweating - one of nature's dirty tricks is that exercise suppresses thirst. Dehydration impairs both physical and mental performance in all types and levels of sport, yet it can be avoided (or at least minimised) by appropriate drinking strategies. Before we explain what those are, here's a bit of background physiology.

Exercise produces heat. Prevention of overheating occurs by transfer of heat to the skin by vasodilation of the cutaneous circulation, and by the cooling effect of evaporation of sweat. Exercise causes body fluid losses from moisture in exhaled air as well as from sweating. Although sweat rates are highest under conditions of high-intensity exercise in heat and high humidity, total fluid losses can be appreciable in very prolonged events, whatever the conditions. Unless fluid losses are replaced by drinks, sweating causes progressive depletion of circulating blood volume, leading to hypohydration (commonly called dehydration) and a thickening of blood. This places a strain on the cardiovascular system, with a rise in heart rate in order to maintain adequate blood flow to exercising muscles and vital organs. As blood volume depletes, blood flow to the skin is reduced. As a result, sweating decreases and heat dissipation from the skin is impaired, causing body core temperature to rise, potentially leading to heat stress, collapse and even death.

Even low levels of dehydration have physiological consequences. A loss of 2% bodyweight (just 1kg for a 50kg person) causes an increase in perceived effort and is claimed to reduce performance by 10-20%. A fluid loss exceeding 3-5% bodyweight reduces aerobic exercise performance noticeably and impairs reaction time, judgement, concentration and decision making - vital elements in all sports, from pole-vaulting to football. A particular issue for boxers is that dehydration increases risk of brain injury.

The two main factors influencing early fatigue and impaired performance (both physical and mental) in all types of sports and exercise are depletion of body levels of carbohydrate (CHO) and/or fluid. Maintaining adequate CHO and fluid intake optimises training benefit by enabling athletes to train harder and for longer, and can make a difference between winning and losing. The opportunity and ability to eat and drink during training and competition depends on the sport; sports drinks may not be the only feasible

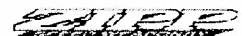
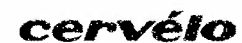
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1.4 litres per hour among women and 1.2-2.5 litres per hour among men in hot, humid conditions (32 deg. C with a relative humidity of 60%). Absolute sweat volume is relatively less for a small, lean athlete. Training status and degree of heat-acclimatisation influence composition of and volume of sweat by inducing earlier onset of sweating, a higher sweat rate and a more dilute sweat, conserving salt. Sweat Na concentration has been reported to vary between 40 and 140mmol/litre in volunteer runners, but little more than 20mmol/litre in heat-acclimatised tennis players.

Whatever the environmental conditions, sweat losses are probably greater than many athletes appreciate. The highest reported sweat rate is 3.7 litres/hour for Alberto Salazar during the 1984 Olympic marathon. Sweat rates of 2 to 3 litres/hour can be expected during short periods of hard exercise in the heat, and an excess of 1.5-2 litres/hour during endurance events. Even in cooler conditions losses are appreciable. During a football game on a cool day (10 deg. C), players can lose up to two litres of sweat, and runners are estimated to lose around 1.2 litres/hour at 6 minute/mile pace on a cool, dry day (double this amount on a hot, humid day). Additionally, fluid is lost via moisture in exhaled air.

Except in extreme circumstances, blood Na levels are maintained during exercise. Sweat is mainly composed of water, and Na losses in sweat represent a small fraction of total body content and are readily replaced afterwards by normal food. Rare cases of hyponatraemia (blood Na depletion) have been observed, usually in events lasting eight hours or more, such as the Hawaii Ironman. This potentially life-threatening state results from 'water intoxication' - the consumption of large volumes of water or drinks containing little or no Na, or insufficient Na to match the losses in sweat which, in hot conditions over many hours, add up.

#### CHO-electrolyte drinks and performance

Since 1984, when the American College of Sports Medicine stated that water was the optimal drink for endurance exercise, many studies have shown performance-enhancing benefits of adding electrolytes (the only useful one being sodium, to speed fluid absorption) and CHO (to provide fuel).

Drinking plain water causes bloating, suppresses thirst (and thus further drinking) and stimulates urine output (therefore is inefficiently retained) - a poor choice where high fluid intake is required. Sports drinks generally contain 10-25 mmol/litre sodium, as salt -

option but most of them do provide a convenient supply of CHO and fluid simultaneously, are well tolerated if used appropriately, and can be adapted to suit individual needs in varying circumstances.

There are guidelines for fluid and CHO requirements of various activities, but deciding what, when and how much an individual athlete should consume is not always straightforward. In particular, sweat rates vary among individuals subjected to the same exercise conditions. Probably the most important feature of any sports drink is PALATABILITY (in large volumes, not just a sip). The perfect drink has no value if it tastes awful, and what suits one person may not suit another.

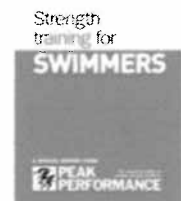
#### Sweat losses

Most research has focused on high-intensity or prolonged exercise in the heat, for obvious reasons; dehydration is potentially fatal. Sweat rate rises with exercise intensity, and is increased by a hot or humid environment and heavy clothing (notably non-whicking, dark-coloured garments), both of which interfere with heat dissipation and sweat evaporation.

Prediction of fluid and sodium (Na) losses in sweat is complicated, since sweat rates and sweat Na concentrations vary widely among individuals exercising under the same conditions. For example, measures of sweat rates during one hour of exercise at 70% VO<sub>2</sub>max at an ambient temperature of 23 deg. C have been quoted to vary between 426g and 1665g. A study of tennis players reported sweat rates of 0.7-

n/a

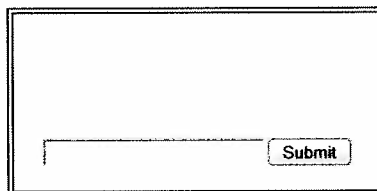
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## Training Principles

### Why do people get involved in physical activity?

People get involved in exercise for a number of reasons: to improve their health and physical condition, to achieve a sporting ambition, to relieve the tension and stress of daily life, to loose weight, it makes them feel good. Participating in sport encourages co-operation in team sports, develops the element of competitiveness, provides a physical challenge and the opportunity to meet new people and make new friends.



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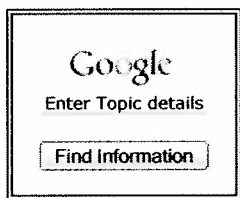
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### Principles of Training

Training to improve an athlete's performance obeys the principles of training: specificity, overload, recovery, adaptation and reversibility.

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### Specificity

To improve the range of movement for a particular joint action, you have to perform exercises that involve that joint action. It is quite possible for an athlete to have good mobility in the shoulder joint but to have poor hip mobility. Conducting shoulder mobility exercises may further improve the shoulder mobility but it will not affect hip mobility.

In addition to developing general levels of all round mobility in an athlete, coaches need to consider the specific mobility requirements of a given event. The coach can analyse the technique of his/her event, identify which joint actions are involved and determine which need to be improved in terms of the range of movement. A thrower, for example, might require improvements in his/her shoulder and spine mobility. A hurdler might need to develop his/her hip mobility.

The amount and nature of the mobility training required by each athlete will vary according to the individual athlete's event requirements and his/her individual range of movement for each joint action. It may be necessary to measure the range of movement for particular joint actions to determine the present range and future improvement.

Specificity is an important principle in strength training, where the exercise must be specific to the type of strength required, and is therefore related to the particular demands of the event. The coach should have knowledge of the predominant types of muscular activity associated with his/her particular event, the movement pattern involved and the type of strength required. Although specificity is important, it is necessary in every schedule to include exercises of a



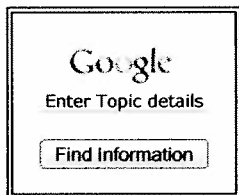
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general nature (e.g. power clean, squat). These exercises may not relate too closely to the movement of any athletic event but they do give a balanced development and provide a strong base upon which highly specific exercise can be built.

To use heavy throwing implements or weighted belts may seem the obvious solution to the specificity problem, but it is probable that by doing so the athlete will unconsciously develop compensatory movements in his/her technique in adjusting to the new weight. Most authorities consider that in the throwing events the training implement should be kept within 15% of the competition weight.

Can we be specific in the speed of movement? Training at low velocity increases low velocity strength substantially but has little effect on high velocity strength (Coyle and Fleming, 1980).

Is there then any justification for slow velocity strength training for athletes who have to perform movements at great speed? Yes. Slow velocity training may be of value in stimulating maximum adaptation within the muscle. Muscle growth (and increase in contractile strength) is related to the amount of tension developed within the muscle (Goldberg, 1975). When an athlete performs high velocity strength work, the force he/she generates is relatively low and therefore fails to stimulate substantial muscular growth. If performed extensively the athlete may not be inducing maximum adaptation with the muscles. It is important therefore for the athlete to use fast and slow movements to train the muscles.

**Overload**

When an athlete performs a mobility exercise, he/she should stretch to the end of his/her range of movement. In active mobility, the end of the range of movement is known as the active end position. Improvements in mobility can only be achieved by working at or beyond the active end position.

- Passive exercises involve passing the active end position, as the external force is able to move the limbs further than the active contracting of the protagonist muscles
- Kinetic mobility (dynamic) exercises use the momentum of the movement to bounce past the active end position

A muscle will only strengthen when forced to operate beyond its customary intensity. The load must be progressively increased in order to further adaptive responses as training develops, and the training stimulus is gradually raised. Overload can be progressed by:

- increasing the resistance e.g. adding 5kg to the barbell
- increasing the number of repetitions with a particular weight
- increasing the number of sets of the exercise (work)
- increasing the intensity- more work in the same time, i.e. reducing the recovery periods

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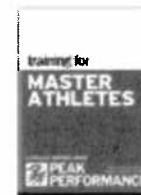
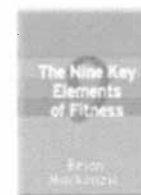
**Recovery**

Rest is required in order for the body to recover from the training and to allow adaptation to take place.

**Adaptation**

The body will react to the training loads imposed by increasing its ability to cope with those loads. Adaptation occurs during the recovery period after the the training session is completed.

If exercises lasting less than 10 seconds (ATP-CP energy system) are repeated with a full recovery (approximately 3 to 5 minutes) then an adaptation in which stores of ATP and CP in the muscles are increased.



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 Long Jump  
 Middle Distance  
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This means more energy is available more rapidly and increases the maximum peak power output. If overloads are experienced for periods of up to 60 seconds, with a full recovery, it is found that glycogen stores are enhanced.

The most noticeable effect of weight training with heavy loads on fast twitch muscle fibres is larger and stronger muscles (hypertrophy).

### Reversibility or Detraining

Improved ranges of movement can be achieved and maintained by regular use of mobility exercises. If an athlete ceases mobility training, his/her ranges of movement will decline over time to those maintained by his/her other physical activities.

When training ceases the training effect will also stop. It gradually reduces at approximately one third of the rate of acquisition (Jenson and Fisher, 1972). Athletes must ensure that they continue strength training throughout the competitive period, although at a much reduced volume, or newly acquired strength will be lost

### Detraining risk for athletes

The effects of a long period of inactivity on physical fitness comes from a UK case study of an Olympic rower, who took more than 20 weeks to fully recover his fitness after an eight-week lay-off.

Reference: 'The detraining and retraining of an elite rower: a case study', J Sci Med Sport 2005;8;3:314-320

Although the athlete in question took the time off in response to the need for a physical and mental break rather than because of illness and injury, this case study has clear implications for injured athletes.

The athlete, an elite heavyweight male rower and current Olympic champion, allowed himself the luxury of eight weeks of inactivity after competing in the Sydney Olympic Games in September 2000. His fitness was assessed by means of a lab-based incremental rowing test on four separate occasions: eight weeks before the Olympics; after eight weeks of inactivity; after eight weeks of retraining; and after a further 12 weeks of training.

The key findings were as follows: After eight weeks' detraining

- $\dot{V}O_2$  peak had decreased by 8%. After eight weeks of retraining it had increased by only 4%, returning to just below pre-Olympic values after a further 12 weeks;
- Power at peak oxygen consumption fell from a pre-Olympic value of 546W to 435W - a reduction of 20%. After eight weeks' retraining it had increased by 15%, resuming pre-Olympic values after a further 12 weeks;
- Power at reference blood lactate concentrations declined by 27%, but returned to just below or just above pre-Olympic levels after 20 weeks' retraining.

The researchers recommend that training programs should limit periods of complete inactivity to no more than two to three weeks. Prolonged periods of inactivity should be avoided and the training programme should incorporate some form of "maintenance" training where a prolonged break is desired.

