

Nutrition ©

< Narrative Notes >

H.E.L.P. for Kids 2008-2009

Teaching Messages:

1. We need water to survive and foods to give us energy to live and grow. (*4th and 6th grades only*)
2. The basic nutrients that provide energy are carbohydrates, proteins, and fats. The amount of energy provided by foods can be expressed in kilocalories (kcal).
3. Although they do not provide energy, vitamins and minerals are nutrients we need in order to stay healthy. Fibers are also important for our health.
4. The digestive system is where the foods we eat are broken down, nutrients are absorbed, and wastes are excreted.

Health Education Life Partners for Kids

To stay healthy, we need to pay attention to the Health Triad: Nutrition, Exercise, and Sleep.

Eating is essential for us to survive and function. All cells in our body need energy to survive, grow, and function. Food is the *only* source of energy for us.

Eating the right foods allows us to reach our potential. Right nutrition combined with a healthy lifestyle helps us study and concentrate, improves our performance in sports, allows us to grow to our maximum height, keeps our skin, hair, and nails looking healthy and can even improve our mood. This is why it is so important for us to learn and understand as much as possible about what essential nutrients we need, how our body uses them, and how what we eat affects how we look, how we feel, and how well we perform our different tasks.

Teaching Message 1 – We need water to survive and foods to give us energy to live and grow.

What is more important for short term survival: food or water?

It is **water!** We can survive longer without food than without water. A person can last several weeks without any food, but will die after only days without water. Water makes up over 60% of our body. It is found in *every* cell we have. It is a part of our blood and other important body fluids. All the chemical reactions taking place in our body need water.

What do you think is the longest time we can survive without water?

The longest we can survive without water is 2-12 days depending on the other circumstances including temperature.

What do you think is the longest time someone has ever gone without food?

A British prisoner who was on a hunger strike went without food for 65 days!

What happens when we have not eaten in a long time?

We may get hungry, weak, or sick. All the cells in our body need energy to survive and to do work. We get the energy from the foods we eat. Food gives us the **nutrients** we need to make energy. This is why we need to eat and drink to stay alive and healthy.

Teaching Message 2 – The basic nutrients that provide energy are carbohydrates, proteins, and fats. The amount of energy provided by foods can be expressed in kilocalories (kcal).

All cells need energy to live, grow, and do work. We make energy from oxygen and nutrients. We get oxygen from the air we breathe and nutrients from the foods we eat! Energy is expressed as kilocalories, kcal or Cal. By definition, a calorie is the amount of heat necessary to raise the temperature of 1 gram of water by 1°C.

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There are many factors that determine a person's energy requirements including weight, height, metabolism, and physical activity. We should take in enough calories to give us the fuel we need. If we take in more than we need, we gain weight. If we do not take in enough, we do not have the energy necessary to keep us healthy and functioning well.

The *only* source of energy is the foods and drinks we take in. The nutrients that provide energy are carbohydrates, proteins, and fats. Different nutrients provide us with different amounts of energy or kcal.

Carbohydrates are easily digested and are the main food group that active young people need to get energy. There are two types of carbohydrates: *simple carbohydrates* and *complex carbohydrates*. Each gram of carbohydrates yields 4 kcal.

Simple carbohydrates are simple and small molecules, such as sugar. Examples of simple carbohydrates-rich foods include candies and sodas. Since simple carbohydrates are small, we digest them easily and they remain in our stomach for only a short time.

Complex carbohydrates are many simple sugar molecules linked together to form larger molecules, such as *starch*. Bread, rice, potatoes, spaghetti, bagels are made up mostly of complex carbohydrates.

Foods containing complex carbohydrates stay in our stomach longer than foods containing simple carbohydrates because it takes longer to digest complex carbohydrates, which must be broken down to simpler sugars first.

Proteins give us energy and are also the “building blocks” of all cells. They are molecules that carry out a variety of functions: acting as enzymes that help digest food, building muscles and bones, helping muscles contract, fighting off illnesses, transmitting information between cells, and contributing to body growth, among others. Each gram of protein yields 4 kcal. Foods that are rich in proteins include meats such as chicken, fish, beef, and also milk, eggs, and plant foods such as beans and nuts.

Fats or lipids give us up to twice as much energy as carbohydrates or proteins. Each gram of fat yields 9 kcal.

Fats are important for our body, because they give us energy, cushion and protect our bones and organs, and help us absorb certain vitamins. Some types of fat are necessary for our body. An example is cholesterol, which is a part of our cell membrane. It is important for us to understand which types of fats and how much we should take in from our foods that would be good for our health.

Foods with fats often taste good. Many of us eat more fat than we need or more than is good for our health. Our body only needs a small amount of fat from our diet; our cells are able to make many of these molecules. One small order of French fries gives us more fat than we need in an entire day! Fats stay in our stomach the longest. This is why if you eat lots of potato chips before dinner, you would not have any appetite for dinner.

Saturated fats/lipids are considered unhealthy. They are solid, not liquid, at room temperature. These fats could build up on the wall of our blood vessels to narrow them down or clog them up altogether, leading to heart problems and diseases. Foods rich in such fats include those made with butter, margarine, cream, and many fried foods. On the other hand, some of the *unsaturated* fats are considered healthy, such as those in olive oil, canola oil, fish, and a variety of nuts.

Teaching Message 3 – Although they do not provide energy, vitamins and minerals are nutrients we need in order to live a healthy life. Fibers are also important for our health.

Vitamins are organic nutrients that are important in helping our cells survive, grow, and function, though they do not yield any energy. Most need to be supplied by our diet. There are different types of vitamins, each with different functions.

Vitamin A (in foods with orange, red color such as carrots) helps our vision. Vitamin Bs (in vegetables, grains, and milk) protects us from anemia or beriberi. Vitamin C (in fresh fruits and vegetables) helps us fight infections.

As with vitamins, **minerals**, which are **chemical elements**, are essential for our health, because they are necessary for cells to carry out certain functions.

What mineral(s) are most important for young people who are actively growing?

Calcium is important, because it helps bones and teeth grow strong. If you do not get enough calcium now, you may have problems later with your bones. Milk is a good source of calcium.

Iron is a part of the hemoglobin molecule carried by the red blood cells. It helps them carry oxygen to all parts of our body. Young ladies need extra iron because they lose blood and iron in their menstrual flows. Spinach and beef are rich sources of iron.

So, if you do not eat a balanced diet, it would be helpful to take a multivitamin-mineral pill everyday day to make sure that you have enough vitamins and minerals to keep you healthy.

Does anyone here like oatmeal or cereal or have you ever had bran muffins?

All of these foods contain something that is important for your body – fiber!

What are fibers and why are they important to our health?

Fibers are the indigestible carbohydrates, which are contained in many plants and fruits. They do not provide us with energy. There are two types of fiber: *soluble fibers* and *insoluble fibers*. **Soluble fiber** acts as a sponge to bind to some “bad” fats to prevent their absorption into our body. **Insoluble fiber** helps our bowls move regularly to get rid of bulk wastes. Oatmeal, many cereals, and bran muffins all contain fiber.

Teaching message 4 – The digestive system is where the foods we eat are broken down, nutrients absorbed, and wastes excreted.

All of our cells need energy to live. How do nutrients in food get into our body to provide energy for our cells to live?

Cells are able to use only small and simple chemicals to make energy, such as glucose. What we eat must be broken down and digested to provide such chemicals. To do this, our body has a Digestive System, one of the organ systems. This is where the foods we eat are broken down, nutrients are absorbed, and wastes are excreted.

Mouth: Digestion begins in our **mouth**, where food is broken down both mechanically and chemically so that it is easier to swallow. Chewing *mechanically* breaks down the food we eat into smaller pieces. Enzymes in *saliva* begin the initial digestion and *chemical* breakdown of starch.

Esophagus: After we swallow our food, it travels down our **esophagus**. The esophagus is a soft muscular tube that leads from our mouth to our stomach. Muscles of the esophagus push our food down to the stomach by an action called *peristalsis*.

Stomach: The food then enters our **stomach** where much of the digestive process takes place. It can expand like a balloon to accommodate the entry of food. Food is broken down further mechanically and chemically. The muscular walls of the stomach squeeze together to mash the food, breaking it down *mechanically*. *Gastric acid* and enzymes produced by cells in the stomach *chemically* break down food further.

How quickly we become hungry after we eat depends on how long different foods stay in our stomach. Fats usually stay the longest, while carbohydrates stay the shortest, with proteins in between.

Small Intestine: The digested food then goes into the **small intestines**. Some digestive process takes place here as well. The resulting simple molecules can now be used to make energy and make energy such as glucose, which is the basic currency to make energy. These molecules move from the small intestines to be bloodstream in a process called *absorption*.

Our small intestine is approximately 20 ft long, which means when stretched out, it is longer than the height of a giraffe! It is twisted and folded to fit inside our body. It is practical to be so long so there is a great deal of area to allow the nutrients to pass efficiently from the small intestines into the bloodstream.

Large Intestine: Food that is not completely digested goes into our **large intestines**. This is where water is reabsorbed into the bloodstream to be used by our body. Our large intestine is about 5 ft long.

Rectum and Anus: The last 6-8 inches of the large intestine is called the **rectum**, which is where the undigested food and roughage that our body cannot use is stored until it is excreted as feces through the **anus**.

Appendix

Vitamin A is essential for eyesight, growth, cell division, bone and teeth development, reproduction, maintenance of the immune system, formation of hair, skin, and mucous membranes. Vitamin A is often measured in Retinal Equivalents, a unit measuring the level of vitamin A activity in a food; however, we use International Units (IUs) for this site.

Sources of vitamin A: Liver, Fish Liver Oils, Fortified Milk, Eggs, Carrots, Dark-green leafy vegetables. **Signs of vitamin A deficiency:** Night blindness, Rough skin, Dry eyes, Impaired bone growth **Too much vitamin A causes:** Blurred vision, Headaches, Skin rashes, Nausea, Insomnia, Fatigue, Joint Pain, Diarrhea, Hair Loss

Vitamin D is normally produced by our body when we are exposed to sunlight. However, due to the growing trend of indoor lifestyles, it is important to ensure enough vitamin D is in our diet. Facilitates the absorption and use of calcium and phosphorus by the body. Helps in the maintenance of bones and teeth.

Signs of deficiency include: Rickets (stunted skeletal growth, bowed legs, abnormal teeth) **Excessive amounts of vitamin D cause:** Calcium buildup, Deafness, Nausea, Loss of appetite, High blood pressure, High cholesterol

Vitamin E aids in the formation of red blood cells and muscles, and protects vitamin A and essential lipids from oxidation. Although never documented as naturally occurring, vitamin E deficiency causes reproductive system failure, liver deterioration, heart damage, and the breakdown of red blood cells. Too much vitamin E can interfere with vitamin K and cause clotting efficiency to decrease.

Good sources of vitamin E: Vegetable Oils, Whole-grain cereals and breads Green leafy vegetables

Vitamin K is noted for its importance in the formation of prothrombin, enabling your blood to clot when you cut yourself. It also plays a role in maintaining proteins necessary for maintenance of blood plasma, the skeletal system, and the kidneys.

Good sources of vitamin K: Green leafy vegetables Cabbage, Cereals

Vitamin C is essential for formation of collagen in skin; helps maintain blood vessels, bones, and teeth.

Vitamin C deficiency causes: Scurvy: Deteriorating muscles, unhealing wounds, weight loss, loss of appetite, irritability, and rough, dry skin. **Too much vitamin C causes:** Some symptoms of scurvy, Kidney stones, Diarrhea, Breakdown of red blood cells. **Good sources of vitamin C:** Orange juice, Citrus fruits, Tomatoes, Strawberries, Green Peppers, Potatoes

Riboflavin, also known as Vitamin B2, aids the release of energy from carbohydrates, proteins, and fats, in addition to promoting growth, maintaining the mucous membranes, skin, and eyes.

Symptoms of Riboflavin deficiency: Skin disorders, primarily near the nose and mouth; Sensitive, itching eyes; Emotional changes, such as depression **Good sources of Riboflavin:** Milk and milk products; Animal protein sources, such as meat, poultry, and fish; Whole-grain and enriched cereals, pastas, and breads; Vegetables such as broccoli, asparagus, and spinach

Folate helps with the formation of hemoglobin in red blood cells and is essential for the replication of genetic material. Folate can be found in a variety of foods, including liver, leafy vegetables, legumes, and some fruits. Try to avoid processed foods, as they generally are much lower in folate.

Symptoms of folate deficiency: Smooth Tongue, Diarrhea, Defective DNA synthesis, Depression

Thiamin is a water-soluble vitamin important for releasing the energy stored in carbohydrates and the creation of an important chemical used by the nervous system. Thiamin deficiency causes a condition known as beriberi, the symptoms of which include mental confusion, muscle weakness, paralysis, cramps, and anorexia. An interesting property of Thiamin is that unlike other Vitamins and Minerals, your need for Thiamin increases as your caloric intake increases. The National Research Council recommends half a milligram per 1,000 Calories as a safe daily intake.

Niacin helps with energy production inside cells, along with thiamin and riboflavin. It also helps in the maintenance of the digestive and nervous systems.

Good sources of Niacin: Food sources high in protein. The body can convert the tryptophan inside protein into niacin, Grain products such as enriched cereals and breads
Signs of Niacin Deficiency: Skin disorders, Diarrhea, Confusion, Irritability, A smooth tongue, Loss of appetite, Weakness and dizziness

Pantothenic Acid is important in the metabolism of carbohydrates, proteins, and fats, along with the formation of hormones and nerve-regulating substances. Although naturally occurring pantothenic acid deficiency has never been documented as occurring in humans, induced deficiencies have shown cramps, vomiting, fatigue, difficulty sleeping, and tingling in the hands and feet.

Good sources of pantothenic acid include: Animal Tissues, Whole grain cereals, Legumes, Milk, vegetables and fruits contain some pantothenic acid

Vitamin B₆ comes in three forms: pyridoxine, pyridoxal, and pyridoxamine. Vitamin B₆ forms red blood cells, assists in the formation of genetic material, helps the nervous system function, and helps convert tryptophan into niacin

Signs of Vitamin B₆ deficiency: Convulsions, Skin disorders, Dizziness, Nausea, Anemia, Kidney stones, **Good Sources of Vitamin B₆:** Whole-grain cereals and breads, Liver, Spinach, Bananas, Meat, poultry, and fish

Vitamin B12 aids in the formation of red blood cells, assists in the formation of genetic material, and helps the nervous system function.

Signs of Vitamin B₁₂ deficiency: Anemia, Pale complexion, Numb fingers/toes; **Good Sources of Vitamin B₁₂:** Liver, Meat, fish, eggs, Milk and milk products, Oysters, Yeast

Vitamins A, C, and E are considered to help in removing oxidants, thus as anti-oxidants.

Additional Notes:

Helpful tips for good nutrition:

1. Eat something from every food group every day. Fruits, vegetables, and whole grains are key.
2. Choose food and beverages low in added sugars. Stay away from sodas and sugary cereals!
3. Check the Nutrition Facts label to avoid saturated fats and trans fats. Try to get your fat sources from fish, nuts, and vegetable oils. Stay away from fast food and fried foods!
4. Keep healthy snacks on hand. Plan! Plan! Plan! If you know you will be hungry after school, bring some fruit or nuts with you. At home, try keeping washed and prepared veggies like carrots or celery to snack on if you feel like munching.
5. Buy foods that have added calcium and other vitamins and minerals – a lot of breakfast cereals are a great source of vitamins and minerals. Check the nutrition facts label on the back of your cereal box.
6. Eat and chew slowly to prevent over-eating.

Why might it be better to eat slowly?

In general, it takes about twenty minutes for the digestive system to tell the brain to stop eating. Therefore, chewing and eating slowly can prevent us from eating too much because we will feel full before we go for big and extra servings of food.

What do you think causes heartburn?

Heartburn is the burning sensation in our chest that occurs when food and acid from the stomach reflux back up into the esophagus. This can occur from eating too much, lying down after a meal, or having a defect in the sphincter that controls the entry of food into the stomach.

What might cause ulcers and how do you know you have one?

An ulcer is an inflammation of the stomach wall that can occur from a bacterial infection, or from an overproduction of acid due to different reasons including high levels of stress. Caffeine, alcohol and aspirin can all contribute to ulcer formation. The sufferers often feel intense pain in their abdomen and will pass dark, black feces due to the mixing of blood with acid.

How does one get diarrhea?

Diarrhea occurs when food that is unable to be digested or absorbed draws more water into the intestines, making the stool watery and expanding the intestinal walls, leading to pain. Diarrhea is often due to an infection that damages the intestinal wall, preventing absorption of nutrients, or from eating indigestible foods. If you have diarrhea, it is very important to drink lots of water to make up for the water lost in the stool.

What leads to appendicitis?

Appendicitis is an inflammation of the appendix. It occurs after indigestible material gets stuck inside the appendix. This can irritate the walls and cause inflammation. An infection can occur over the inflamed area and lead to more inflammation, resulting in a bursting of the appendix.

Why do our stomachs *growl* when we are hungry?

The muscle wall of our stomach contracts to mash the food. When our stomach is empty, stomach muscles contract to produce a growling sound.

Video clips/Animations/PowerPoints

- Magic School Bus, “For Lunch” video:
 - <<http://www.youtube.com/watch?v=Og9-cikC3a0>> Part 1
 - <<http://www.youtube.com/watch?v=2vGLRLgcDpc>> Part 2
 - This animation teaches students about the digestive system in a fun, engaging way by taking them inside the digestive tract to see the action.
- “Digestive System: 101”
 - <<http://www.youtube.com/watch?v=1nFwO-9iU5Y>>.
 - This video provides a very detailed explanation of the digestive tract with clear 3-D animation.

Activities

Sorry! Nutrition Edition. Instructions below:

Materials: “Sorry!” Game board, flashcards, team pieces/runners

1. Divide the class right down the center into two teams
2. Place both Team 1 and Team 2’s player magnets at the start.
3. Fairly & uniformly, go around each team one by one (alternating teams each turn) and have each player draw a flashcard and read it. Each flashcard will have the picture of a food.
4. If the student can correctly categorize the food on the card to a nutrient group, either carbohydrate, protein, or fat, his/her team gets to roll a die and move the number of spaces on the die.
5. Continue until one team moves ahead 50 spaces and reaches “Finish.” That team wins the game.