

This backgrounder covers:

- ☀ Getting energy from the sun
- ☀ Plants as our source of energy
- ☀ A closer look at grains
- ☀ Getting energy from our food
- ☀ Using energy

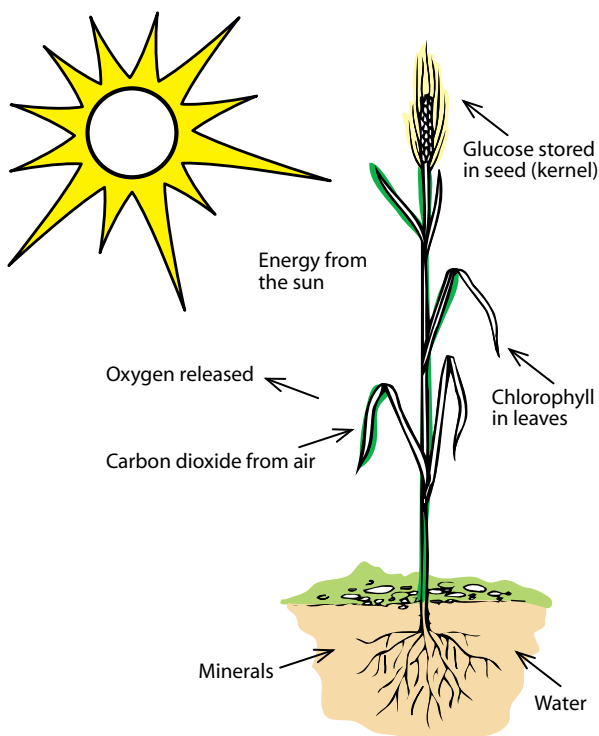
Everyday we need energy to live, work and play. This energy starts with the conversion of the sun's energy by plants. The energy in the form of glucose or starch is stored in a plant until we use the plant for food. We digest and metabolize the food to release the energy we need daily.

Getting energy from the sun

Light from the sun is a source of energy used by the plants in a process called photosynthesis. When that light energy gets to a plant, all sorts of reactions can take place to store energy in the form of glucose molecules.

Inside the leaves of the plants are structures called chloroplasts where photosynthesis occurs. Chlorophyll, found in the chloroplasts, is the magic compound that can grab that sunlight and start the whole process. This process converts carbon dioxide from the air and water from the ground and combines with light to create oxygen and glucose.

Photosynthesis in a Wheat Plant



Plants as our source of energy

Glucose is the building block of carbohydrate, which is stored in the plant. Different plants store slightly different forms of carbohydrates. Carbohydrate is found in plant food (grains, vegetables and fruit) in the form of sugars (simple carbohydrate), starches (complex carbohydrate), and fibre (non-digestible carbohydrate). Simple sugars are recognized as their name ends in 'ose' as in glucose or sucrose.

Forms of carbohydrates Sources in our food supply

Glucose	Fruit, sweet corn, honey
Fructose	Fruits and honey
Maltose	Malted barley
Sucrose	Table sugar, molasses, maple syrup
Lactose	Milk and milk products
Starch	Grains, vegetables, legumes
Fibre	Grains, vegetables, fruit, nuts, seeds, legumes

Grains such as wheat, rice, oats and rye and their products such as bread, pasta, rice, oatmeal, breakfast cereals, etc. are the major sources of food for the world and are the best sources of complex carbohydrate (starch).

Vegetables, especially tubers, such as potatoes, and legumes, such as kidney beans, are also good sources of starch.

Other vegetables and most fruit have a higher amount of simple carbohydrates such as glucose and fructose.

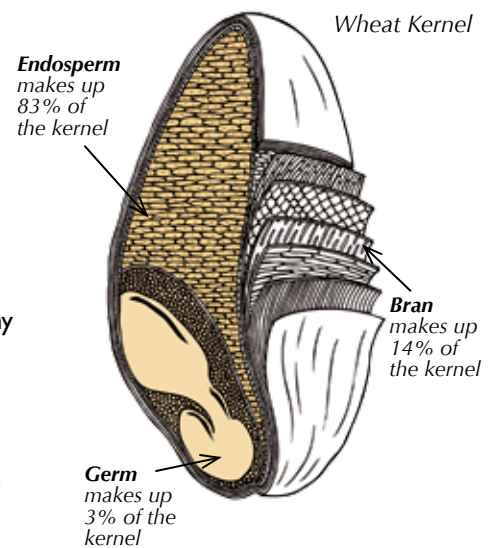
A closer look at grains

Carbohydrate is the major nutrient found in the grain kernel, in the part known as the endosperm.

All grain kernels have three parts: the endosperm, the bran, and the germ.

The endosperm is the largest part of the kernel—the starchy part. When we eat white rice or pearl barley, we are eating the endosperm part of the kernel. The endosperm of wheat is milled to make white flour used in bread, pasta, cous cous and other products. Similarly, the endosperm in corn is ground into cornmeal or corn flour.

The bran part of the wheat kernel is where most of the fibre is found.



(percentages are approximate)

Getting energy from our food

Starch or complex carbohydrate digestion starts in the mouth. Starch is physically broken down by chewing. In addition, enzymes in the saliva, from the pancreas and in the small intestine further break down the starch and simple carbohydrate. The end product is glucose. Glucose is absorbed from the small intestine and travels throughout the body in the blood stream. Once in the body, glucose is used in three main ways:

1. metabolized for energy by all the cells in our body, including our brain,
2. stored as glycogen in the liver and muscles to be used for energy at a later time, and
3. converted to other substances like amino acids, fat, other carbohydrates.

Plants produce carbohydrates through the process of photosynthesis. In a reverse process we break down the carbohydrate to produce energy:

Carbohydrate (glucose) + Oxygen =
Carbon dioxide + water + energy

Energy is measured in kilocalories (listed as Calories on the Nutrition Facts panel on a food label) or kilojoules (the metric equivalent of Calories).

Using energy

There are 3 types of activities needed to keep a body healthy: endurance activities, flexibility activities and strength activities. All use your muscles and the energy stored in our bodies from our food.

Examples of activities that can be done at school are:

Endurance activities:

- Walking around the school yard or community
- Having ice skating days
- Cleaning up the school yard or school garden
- Cross-country running
- Playing basketball or other sports

Flexibility activities:

- Stretching in class
- Dancing
- Cleaning the classroom (sweeping, mopping)

Strength activities:

- Raking the school yard
- Climbing school stairs
- Exercises like push-ups or abdominal curls
- Carrying school books in backpacks

Interesting Facts

One slice of bread contains between 80 and 90 Calories (or 336-378 kilojoules) of energy

That slice of bread will give you enough energy to run or play basketball for about 8 or 9 minutes

Companion activities/Resources:

- ✓ Sandwiches and beyond
- ✓ Photosynthesis in a wheat plant
- ✓ Learning about carbohydrates
- ✓ Parts of a wheat plant

Websites worth checking out:

- ✓ Canada's Physical Activity Guide for Children www.phac-aspc.gc.ca/pau-uap/paguide/child_youth/children/index.html
www.phac-aspc.gc.ca/guide/index_e.html
- ✓ Oklahoma Ag in the Classroom: The Wheat Plant www.clover.okstate.edu/fourh/aitc/lessons/extras/facts/wheat.html
- ✓ Grains-they're essential! Program www.GrainsEssential.ca

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Grains
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