**How Cells Get Energy – Cellular Respiration**

Cells cannot work without energy any more than a computer can work without being plugged in and turned on. The energy that cells use comes from food. What is food? For animals, food may be a sandwich, a mouse, or a blade of grass. For plants, food is carbohydrates made in their leaves by the process of photosynthesis. What all foods have in common, however, is particles that contain chemical energy.

The energy in food can only be released after food particles have entered the cells and have been broken down by a chemical energy. The process that releases food energy is called cellular respiration.

You probably think of respiration as breathing in and out. That is what you and all other air-breathing animals do to obtain oxygen from the air and to get rid of carbon dioxide. Remember that cells carry out all the functions of living things. Your cells use the oxygen you breathe in for cellular respiration, and they produce the carbon dioxide that you breathe out. Cellular respiration occurs in nearly all living cells of every organism – in plants and micro-organism, as well as in animals.

Inside cells, oxygen combines with food particles (such as carbohydrates) in cellular respiration. Remember this equation:

**Carbohydrates + Oxygen Carbon dioxide + water + energy**

This chemical change can be compared to the burning of fuel. Like burning, much of the energy from the reaction ends up as heat. Think about what happens when your body demands more energy, such as if you run a race. First, you need a good meal of energy rich carbohydrates. As you run, you breathe more quickly, pumping in more oxygen for your cells to use. The oxygen and food particles react inside your cells, producing energy for your muscles. At the end of the race, you feel warm.

Powerhouses of the cell

Cellular respiration does not take place everywhere inside the cell. It occurs mainly inside the mitochondria. Because energy is produced within the mitochondria, these organelles are often called the “powerhouses” of the cell. Different cells use different amounts of energy and have different numbers of mitochondria. Active cells, such as those in muscles, may contain several hundred mitochondria. The energy produced inside the mitochondria can be used by other parts of the cell.

Why do cells need energy? Cell membranes need energy to move materials into and out of cells by active transport. Muscle cells need energy to contract. Nerve cells use energy to send signals. Most cells also use energy to grow and reproduce.

