Pass the Sugar

Are you a fan of sweets? Did you know that cells have a sweet tooth? In fact, cells get all their energy from sugar! Learn about how cells turn sugar into energy through cellular respiration and explore the three steps of cellular respiration in this article.

Have you ever felt tired before lunch when you haven't eaten since breakfast? That's because we get our energy from food. Most foods we eat contain a sugar called glucose. Not only does glucose make foods taste sweet, but it is also our cells' main source of energy.

Just like our digestive system breaks down the food we eat, cells must break down glucose to use it. Cells use oxygen to break down glucose and release its energy during a process called cellular respiration. This process is all about changing food into a form of energy cells can actually use called ATP.

Unlike glucose molecules, ATP molecules can be used directly by cells for energy. Cellular respiration is a cell's way of turning the energy found in glucose into ATP to power its functions.

To bake a cake you need eggs and flour. For cellular respiration cells need glucose and oxygen. When these ingredients are combined three things are made: carbon dioxide, water and energy.

Cellular respiration uses glucose and oxygen to make carbon dioxide, water and energy.

If cellular respiration is all about energy, then what are these other products? When you crack eggs to bake a cake you make some waste- egg shells. When cells are making ATP they also make waste- carbon dioxide and water.

Three Steps

There are three steps to cellular respiration: glycolysis, the Krebs cycle and the electron transport chain.
Steps of Cellular Respiration

This glucose which contains six carbon atoms is split in the cell through Glycolysis. This process is anaerobic as without the help of oxygen, 2 molecules called pyruvate and 2 energy molecules called ATP (explained later) are formed. Think of inserting a dollar bill into a vending machine to generate quarters to be used as your bus fare in your ride to the zoo.

Cells also need the most important ingredient which is oxygen. We breathe in oxygen. The more oxygen we breathe in, the more energy we produce. That is why when you are exercising, your sports teacher always asks you to breathe more and more consciously.

In the aerobic process, the oxygen is used with this pyruvate (remember the molecules formed from the fuel like component called glucose) to produce the energy molecules ATP.

The next step is called the Kreb’s cycle, which is a succession of enzymatic reactions, where the acetate, from the pyruvate, is oxidized and changed into energy molecules and carbon dioxide and water are released.

The Electron Transfer Chain also is a series of chemical reactions, where electrons are shuttled down, and energy from the oxygen atoms are converted into hydrogen atoms, which produce ATP.

This energy is stored and used through molecules called adenosine triphosphate (ATP) in a special compartment called the mitochondria. They are called the power boosters of the cells, as they supply energy to the cell. They look like sausages. They keep unwanted particles out of the cells.

They also regulate the water amounts in the cells and crumble proteins etc. When your mother tells you to eat fish and drink lots of milk, she is doing this for your own good and not hers. Your body needs proteins for again those laborious cells; which are producing energy to keep you kicking the football to the goalpost every time. The protein is further broken down into amino acids that are used in restocking the cells and manufacturing new cells.

Cellular Respiration can be summarized as
Glucose + Oxygen= Carbon Dioxide + Water + ATP (Energy)

Cellular Respiration in Plants??? It is the reverse! You guessed it... Photosynthesis!!!!

Plants use sunlight to turn carbon dioxide and water into glucose. Also, photosynthesis occurs only when there is sunlight.