

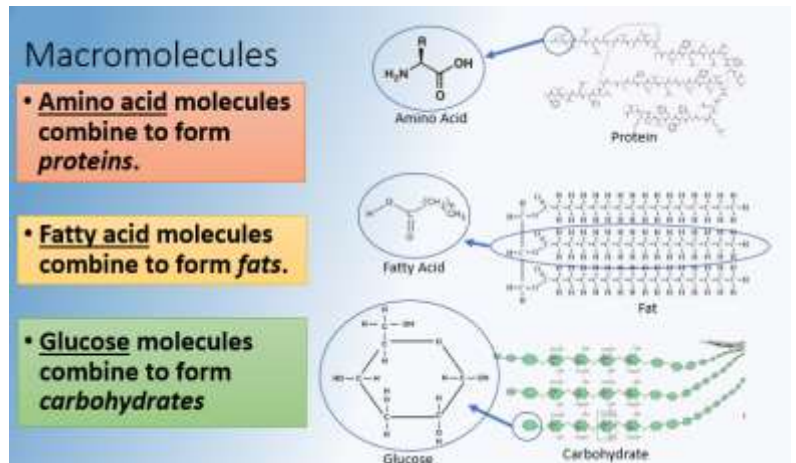
## Animals Unit Summary

**Intro to Cells.** All living organisms (animals, plants, fungi, bacteria, etc.) are comprised of cells. A cell is the smallest thing that can be alive. Animal cells are primarily made from two key ingredients – protein and fat from the animal’s diet. The outer membranes of cells are made from fat. The structures inside of cells are mostly made from proteins. Cells also use carbohydrates from the diet as a source of chemical energy.



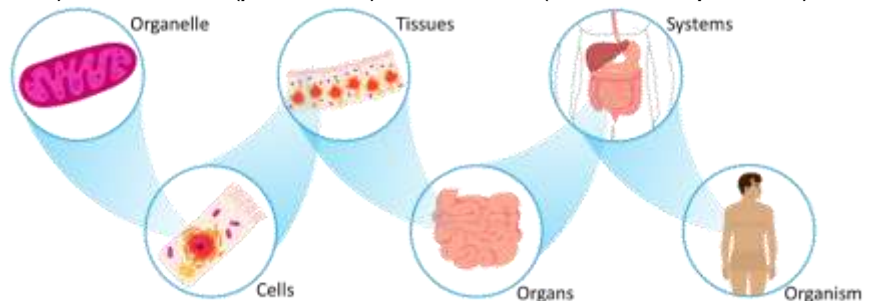
**Macromolecules.** The fats, proteins, and carbohydrates found in cells are all examples of macromolecules. A macromolecule is a long chain of individual molecules bonded together.

Fats, proteins, and carbohydrates are made from different molecules. Fats are made from long chains of fatty acid molecules. Proteins are made from long chains of amino acid molecules. Carbohydrates are made from long chains of glucose molecules.

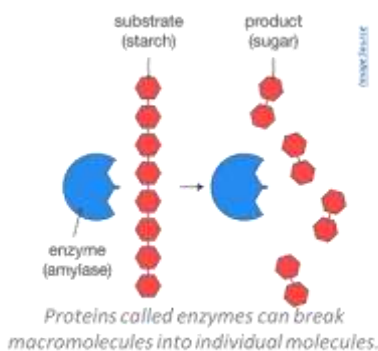


**Cell Organization.** Cells contain organelles, which are specialized structures with specific jobs. Most organelles have their own fatty membranes and functional proteins. Examples of organelles include: mitochondria (*cell energy*); nucleus (*stores DNA*); membrane (*protection*); ribosomes (*assembles proteins*).

A group of similar cells form tissues (*like muscles, nerves, and connective tissue*). Different tissues form organs (*such as the heart and stomach*). Groups of similar organs form systems. Systems comprise an organism (*an individual animal*).



**Digestion.** Digestion is the process in which large macromolecules in food are disassembled into smaller individual molecules. This is necessary so that these molecules can be absorbed into the blood - macromolecules like fat, protein, and carbs are too big to be absorbed.



Enzymes are specialized proteins that assemble, disassemble, or rearrange molecules. Digestive enzymes convert macromolecules into smaller molecules that can be absorbed into the blood. For example, enzymes disassemble carbohydrates into individual glucose molecules.

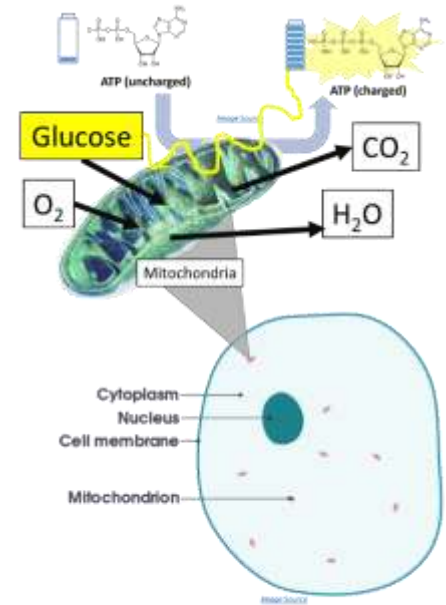
Once macromolecules are disassembled into smaller molecules, they move to the bloodstream and are transported to cells. Cells can then use glucose, fatty acids, and amino acids for matter and energy. Glucose is used primarily for chemical energy in cellular respiration. Fatty acids and amino acids are used as the main sources of matter (atoms) to build and repair cells (biosynthesis).

**Cell Respiration.** During cellular respiration, cells acquire chemical energy by rearranging atoms in glucose & oxygen to form  $\text{CO}_2$  &  $\text{H}_2\text{O}$ . This occurs in organelles called mitochondria. Rearranging the atoms of glucose and oxygen molecules enables cells to obtain the chemical energy found in the high energy bonds (C-C & C-H)

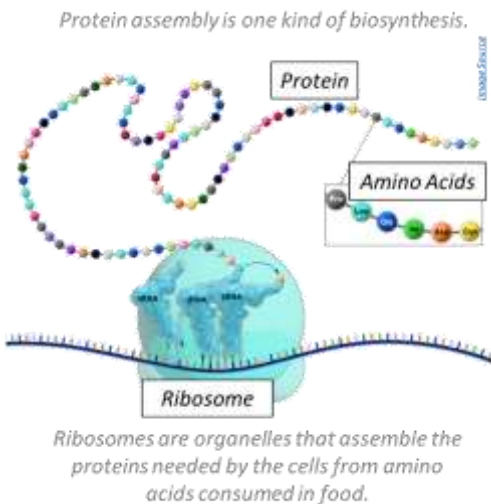
of glucose. This chemical energy is then moved to a new molecule called ATP. ATP powers most cellular activities. It functions like a rechargeable battery for the cell.

While glucose (from carbohydrates) is most frequently used as a source of chemical energy, mitochondria also can utilize fatty acids during cellular respiration. Amino acids are rarely used for cell respiration.

**Biosynthesis.** Biosynthesis is the process in which organisms use molecules they consume to reassemble macromolecules needed for their cells. Biosynthesis occurs anytime a cell assembles new molecules using atoms from food. Multiple forms of biosynthesis occur in cells.



The mitochondria is where cellular respiration occurs in order to recharge ATP.



Protein biosynthesis occurs in the ribosomes. During protein biosynthesis, amino acids from consumed proteins are reassembled back into long chains that form the cell's proteins.

Fat biosynthesis occurs in the cell's cytoplasm (the jelly-like liquid of the cell). Fat biosynthesis can occur in two ways. Cells most commonly use fatty acids from the diet to assemble the fats needed by the cell. Also, enzymes can rearrange the atoms in other food molecules (like glucose) to create fatty acids that are assembled into fat.



A cell splits into two cells via mitosis.

**Mitosis.** As cells assemble new fat & protein macromolecules, they grow larger. Mitosis is the process of dividing one large cell into two smaller cells. Mitosis enables organisms to grow larger, heal wounds, and gain tissue (like muscle).

**Key Vocab:**

- ATP: the molecule that directly powers most cellular activities; it functions like a rechargeable battery for the cell.
- Biosynthesis: the process in which cells use molecules they consume to reassemble macromolecules like fat and protein.
- Carbohydrates: macromolecules that provide chemical energy and are made from long chains of glucose molecules.
- Cell: the smallest unit of life; a cell consists of a fatty membrane surrounding protein structures & fluid.
- Cellular Respiration: the process in which cells acquire chemical energy by rearranging atoms in glucose & oxygen to form CO<sub>2</sub> & H<sub>2</sub>O.
- Cytoplasm: the jelly-like liquid inside the cell.
- Digestion: the process in which large macromolecules in food are disassembled into smaller individual molecules.
- Enzymes: specialized proteins that assemble, disassemble, or rearrange molecules.
- Fats: macromolecules that make up the membranes of cells and can store energy; fats are made from long chains of fatty acids.
- Macromolecule: a long chain of individual molecules bonded together.
- Membranes: the outer coverings of cells that are mostly made from fatty molecules.
- Mitochondria: the organelles where cellular respiration occurs and where ATP is 'recharged'.
- Mitosis: the process of dividing one large cell into two smaller cells.
- Organ: collection of different tissues with a similar function.
- Organelle: a specialized structure in cells with a specific job needed for cellular function.
- Proteins: macromolecules that are the functional parts of cells and are made from long chains of amino acid molecules.
- Ribosomes: cellular structures where proteins are assembled using amino acids from food.
- System: different organs that perform similar functions.
- Tissue: group of similar cells.