

Cell Structure and Function Study Guide

Key Terms: cell, eukaryote, prokaryote, unicellular, multicellular, organelle, nucleus, cytoplasm, cell membrane, cell wall, chloroplast, lysosome, Golgi body, endoplasmic reticulum, vacuole, ribosome, mitochondria, homeostasis.

1. These structures are found within a cell. They have special jobs to perform that help the cell to function. These structures are called the _____.

2. What is the difference between multicellular and unicellular?

You will need to understand the function of the following organelles and the types of cells they are found in:

Organelle	Cell Type (circle where they are found)	Function	Analogy
Vacuoles	Plant/Animal/Both		Ex: Fridge
Mitochondria	Plant/Animal/Both		Ex: Gym
Ribosomes	Plant/Animal/Both		Ex: food court
Chloroplasts	Plant/Animal/Both		Ex: Solar Panels
Nucleus	Plant/Animal/Both		Ex: City Hall
Cell Wall	Plant/Animal/Both		Ex: State Lines
Cytoplasm	Plant/Animal/Both		Ex: Jello
Lysosomes	Plant/Animal/Both		Ex: Lysol
Endoplasmic Reticulum	Plant/Animal/Both		Ex: Highways
Cell Membrane	Plant/Animal/Both	Selectively Permeable	Ex: Border Patrol
Golgi Bodies	Plant/Animal/Both		Ex: Post Office

Cell Theory – What does the cell theory state?
1.
2.
3.

Match the scientist with their contribution.

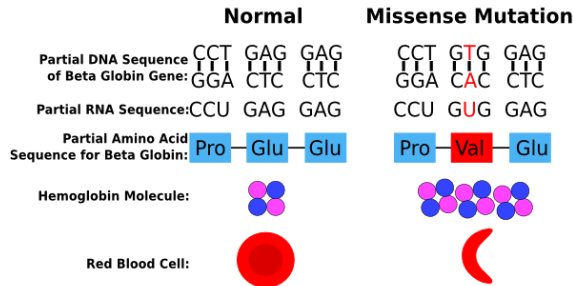
Scientist	Contribution
Robert Hooke_____	a. First to name cells. It said they looked like little rooms or "cells".
Rudolf Virchow_____	b. Studied pond water and called the little organism "animalcules" (small animals). He was the first to see single-celled bacteria.
Theodor Schwann_____	c. He discovered all plants were made of cells.
Matthias Schleiden_____	d. He discovered animals were made of cells; therefore all living things were made of cells.
Anton Von Leeuwenhook_____	e. He discovered that all cells come from other cells.

3. What is the difference between eukaryotes and prokaryotes? Give an example of an organism that is a eukaryote and prokaryote?
4. What two organelles do plant cells have that other organisms do not? _____ and _____
5. What is homeostasis?
6. Leigh Syndrome affects approximately one in 36,000 to 40,000 newborns. Most cases of Leigh Syndrome are associated with a nuclear mutation in the SURF1 gene. This leads to a defect in a protein found in cellular organelles responsible for energy production. Since these organelles are found in all cells, all organs of the body could be affected, especially organs like the brain, heart and GI tract which have high-energy needs. Explain how Leigh Syndrome affects homeostasis?
7. If a cell were exposed to a poison that blocked the cell's ability to manufacture ATP (energy), what effect would that have on the cell membrane's ability to maintain homeostasis?
8. Explain how the ribosomes, rough endoplasmic reticulum and Golgi apparatus maintain homeostasis?
9. Based on the evidence in the picture, explain what the cell should do next to regain homeostasis?



10. Tay-Sachs disease is an inherited illness in which a baby thrives until about six months of age. Around six months they suddenly seem to lose the ability to roll over or sit for a few seconds. Due to a genetic defect, a baby with Tay-Sachs disease is lacking one of forty lysosomal enzymes. As a result, fatty material builds up on the nerve cells which makes the nervous system fail and ultimately results in death. Explain how Tay-Sachs disrupts homeostasis?

11. Hemoglobin is a protein found in red blood cells of vertebrates and in the plasma of many invertebrates. The function of this protein is to transport oxygen throughout the body and to bring carbon dioxide back to be expelled from the organism. An argument can be made that if very minor changes in the amino acid sequence of the protein is altered, the mutated protein may not be as efficient at carrying oxygen as the normal hemoglobin. Using the model, what is the evidence for the above argument?

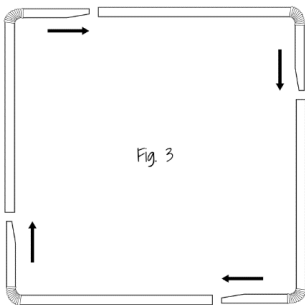


12. A student is designing an experiment using eggs, water, and sugar. She pours 100 mL of water into 4 different beakers and heats the water until it boils. She then adds 5g, 10g, and 20g of sugar to 3 of the four beakers, leaving the 4th beaker untouched with just water. For her experiment she labels four beakers as follows:

Beaker 1: Water
 Beaker 2: 5% Sugar
 Beaker 3: 10% Sugar
 Beaker 4: 20% Sugar

If the yolk of the egg has a 10% solute concentration, answer the following questions.

- What is the independent variable in the experiment?
- What is the control group in the experiment, if there is one?
- What concentration represents the hypertonic solution?
- What happens to the egg when placed into the 5% sugar solution?



Bubbles are often used to model cell membranes...bubbles tend to be fluid, flexible, and to a degree able to repair itself. In a lab activity, Johnny builds the below apparatus out of straws (figure 3). His intent is to dip the apparatus into soap water so that a soap film exists within the straws.

- How can Johnny use this apparatus to model how cell membranes are not static and able to bend and flex without breaking in order to adapt to changing environments?
- How can Johnny use this apparatus to model how cell membranes can repair small breaks in the bilayer?