Cell Components

Most eukaryotic cells (and even some prokaryotic cells) have similar organelles with standard functions. Each cell has a membrane which separates the inside of the cell from the harsh outside environment and regulates what can enter the cell. Eukaryotic cells are defined by the fact that they have a nucleus to store DNA (genetic information). The rough endoplasmic reticulum is studded with ribosomes that produce proteins for excretion. Vesicles transport those proteins (and other proteins in the cell) to the Golgi complex, which processes them and transports them to the intended destination. Energy production occurs through mitochondria in animals, and through both mitochondria and chloroplasts in plants. Reactions in the mitochondria consume carbohydrates and create ATP. Animals have to consume carbohydrates, while plants synthesize it with chloroplasts. The smooth endoplasmic reticulum (ER) synthesizes lipids, while free-floating ribosomes make protein from RNA templates. Lysosomes help recycle proteins and other products, and also can kill the cell in apoptosis, or programmed cell death. This is a failsafe in case the cell becomes aged or infected. Finally, vacuoles store waste and toxins for processing in all cells. However, in plants, vacuoles also store large amounts of water.

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Cell membrane separates inside and outside

Jail-Cell Membrane Separating Inside from Outside

The cell membrane exists in all cells because it is the basic structural unit that separates the inside of the cell from the outside environment. It is used to selectively allow certain molecules to enter the cell.

Nucleus stores DNA

Nuclear-Symbol Storing DNA

The nucleus is common to all eukaryotic organisms and is the storage place for DNA, genetic information. It is the site of transcription, where RNA is made from DNA for eventual protein synthesis.

Rough ER has ribosomes making proteins

Rough EoR with Rabbit-Zombie making Mr. Protein

The rough endoplasmic reticulum (ER) is studded with ribosomes, giving it a rough appearance. Those ribosomes make proteins that are typically used in secretory pathways (i.e. sent out of the cell).

Vesicles transport proteins to Golgi complex and out of the cell

Mr. Protein in Vest thrown to Gold G and jumping out of the cell

Vesicles are small membrane-enclosed sacs that form around proteins and transport them inside of a cell and to the outside of a cell. They fuse with the cell membrane (or organelle membrane) and release their contents in a process called exocytosis.

Golgi complex packages and transports molecules

Gold-G Packaging and Transporting Mole-Lecules

The Golgi complex is the packaging and transport center of the cell. Any proteins or products that need to be secreted out of the cell are processed through the Golgi complex, and intracellular transport also occurs through it.

In animals, mitochondria produce ATP

Mint-Con Making ATP at Factory with Animals

Animal cells only have mitochondria for producing energy, and they create ATP by the breakdown of carbohydrates in a process known as cellular respiration.

In plants chloroplasts create carbohydrates

Clover-Plate with Bread

Plants have chloroplasts and mitochondria for producing energy. Chloroplasts produce carbohydrates using energy from light.

In Plants Mitochondria Consume Carbohydrates to Make ATP

Mint-con Eating Bread and Making ATP at the Factory with Plants

Plants also have mitochondria, which serve the same function as their animal counterparts. Mitochondria break down the carbohydrates and create ATP.

Smooth ER synthesizes lipids

Smooth EoR with Lips

The smooth endoplasmic reticulum (ER) is responsible for the majority of lipid synthesis that occurs in cells.

Lysosomes are used for recycling and apoptosis

Laser-Zombie with Recycling-Bag and Self-Destruct Button

Lysosomes are used in cellular recycling, or the breakdown of products no longer needed into their precursor molecules. Lysosomes are also essential in regulation. In the event that a cell is too old or infected, lysosomes release enzymes that digest the cell and cause apoptosis, or programmed cell death.

Vacuoles are used for storing waste and toxins

Vaccuum-Mole with Toxin Symbol

Vacuoles are generally used for storing waste and toxins in most cells. The waste and toxins are eventually excreted out of the cell or processed. However, in plant cells, vacuoles hold large amounts of water.

Ribosomes produce protein

Rabbit-Zombie Assembling Mr. Protein

Ribosomes are free-floating as well as bound to the rough ER. All ribosomes serve to create protein from template RNA strands. This occurs primarily in the cytosol, and also on the rough ER.

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