

Structure and function of cells and organelles essay



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Human Biology Unit 1 Assignment. A cell is a small membrane enclosed structure filled with an aqueous solution where the organelles are found. Organelles are small structures within cells that perform dedicated functions. All eukaryotic cells have the following organelles: Nucleus, Ribosomes, Lysosomes, Cytoplasm, Nucleolus, Cell Membrane, Mitochondria, Endoplasmic Reticulum (ER) and Golgi Body. Insulin is a protein compound made up of more than one chain of amino acids. Amino acids are the building blocks of protein and it is these that determine the structure and function of proteins.

Insulin is made within the pancreas where there are clusters of specialised cells called the islets of Langerhans. A type of cell within the islets is the pancreatic beta cell and this is where insulin is made, stored and secreted. To enable the cells to be able to produce the insulin ATP energy is required. 1. Website Image of Beta Cell - <http://www.pharmabase.org> Mitochondria are the organelles that make the molecules that provide the cell energy called Adenosine Tri phosphate (ATP). One of these organelles is a mitochondrion which means threadlike granule.

The mitochondria organelles are surrounded by a special bilayer membrane, this membrane controls substances moving in and out. The inner membrane folds are called cristae. Their function is to increase the surface area on which the final stage of aerobic respirations take place. Inside the inner membrane is the matrix containing enzymes, a circular DNA molecule and ribosomes. 2. Website Image of Structure of Mitochondria - <http://www.tutorvista.com> Insulin is produced in stages and begins in the ribosomes on the Rough Endoplasmic Reticulum (RER).

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Ribosomes are small granules found in all cells and are made up of one large and one small subunit and comprise of rRNA. This is the only organelle not made from membranes. The ribosomes job is to assemble the insulin amino acids into proteins under the direction of the cell's DNA which is located in the nucleus of the cell. 3. Website Image of Structure of a Ribosome - <http://publications.nigms.nih.gov> The nucleus acts as the control centre for the cell. It contains the DNA that directs all function of the cell and carries the genetic code for all cell functions including the manufacturing of proteins.

The nucleus has its own lipid bilayer (nuclear envelope) with large pores. The membrane is selectively permeable and regulates what proteins and RNA can enter or leave the nucleus. The nuclear envelope acts as a barrier separating the contents of the nucleus (DNA in particular) from the cytoplasm. 4. Website Image of Structure of the Nucleus - <http://www.emc.maricopa.edu> The ER is responsible for the production of the protein and lipid components of most of the cells organelles. It is an elaborate system of membranes found throughout the cell and can be loose or tight.

The area where the production of insulin occurs is known as the RER as the membranes are coated with ribosomes. The ribosomes use the information in the nucleic acid to synthesise the insulin protein. When a "rough model" of the protein has been made it is then moved to the elaborate system of the membranes within the ER. Here enzymes will modify the molecule separating it into two peptide chains, the A and B chain. These are then joined together by a third chain known as the connecting peptide or C peptide as shown in the diagram below. 5. <https://assignbuster.com/structure-and-function-of-cells-and-organelles-essay/>

Website Image of C peptide chain - <http://t0.gstatic.com> The storage form of insulin is called proinsulin and this will move from the ER to the golgi in a transport vesicle. The golgi body is composed of stacks of flattened, hollow membranous sacs on top of each other. The golgi prepares the insulin for secretion from the cell by folding it in a certain way that causes chemical bonds to form between some of the amino acids. The proinsulin is then stored into a small membrane enclosed sac called a vesicle. The vesicles for secretion are pinched off cavities within the golgi.

The membrane enclosing the vesicle is similar to that of the cell membrane. Enzymes will detach the connecting peptide chain from the A and B chains. This then creates two separate entities, C peptide and the active form of insulin. The vesicle then moves out of the golgi and fuses with the cell membrane to release the insulin and C peptide out of the cell and into the bloodstream as shown in the diagram below (cell transport). 6. Website Image of vesicles transporting from the Golgi Body to the Cell Membrane - <http://www.google.co.uk> The cell membrane is partially permeable to allow some things to pass through whilst blocking other things. The structure is known as the fluid mosaic structure (image of this below) and is made up of a phospholipid bilayer. The bilayer protects the cell, provides structural support and controls the flow of molecules into and out of the cell. The bilayer is two sheets of phospholipids, this consists of a pair of fatty acid chains and a phosphate group attached to a glycerol backbone.

The heads are hydrophilic and the tails hydrophobic. They face inwards towards each other and the polar (hydrophilic) heads face out and the nonpolar fatty acids (hydrophobic) hang inside as far away as possible from <https://assignbuster.com/structure-and-function-of-cells-and-organelles-essay/>

the water. The membrane is embedded with proteins and strengthened with cholesterol molecules. The membrane proteins determine which particles can pass through the membrane, serve as enzymes and act as markers that are recognised by chemicals and molecules from inside and outside of the cell.

Carbohydrates attach to proteins and lipids within the cell membrane to form glycoproteins and glycolipids. Their role is cell recognition and to act as receptors for hormones. 7. Website Image of Fluid Mosaic Model - <http://1.bp.blogspot.com> There are five methods of cell transport, three are passive (no energy required) - Diffusion, Osmosis, Facilitated diffusion and two active (energy required) - Active Transport and Cytosis (includes Endocytosis and Exocytosis) as described below. 1. Diffusion - Movement of particles from area of high to low concentration. . Osmosis - Diffusion of water across a partially permeable membrane. 3. Facilitated Diffusion - Embedded membrane proteins act as channels allowing molecules to diffuse through. 4. Active Transport - Energy is needed (ATP) to move particles across a concentration gradient across the membrane. It uses carrier proteins - embedded proteins change shape to open and close passages across the membrane. 5. Cytosis - includes Endocytosis (taking something into the cell) and Exocytosis (taking something out of the cell).

Insulin is transported by exocytosis. As previously described Insulin and C peptide are packaged in the golgi into secretory vesicles which then accumulate in the cytoplasm. When the beta cell is stimulated, the vesicle carrying the insulin and C peptide will fuse with the cell membrane and the insulin is then secreted from the cell. The vesicle membrane then becomes <https://assignbuster.com/structure-and-function-of-cells-and-organelles-essay/>

part of the cell membrane. This process carries the insulin out of the pancreatic cell and into the body's bloodstream where it can be used to control blood sugar levels.