Structure and function of cell nucleus

Cells play a major role in living organisms. Cells have various organelles that make it play its role in living organisms. Some of these organelles include nucleus, mitochondria, ribosomes, endoplasmic recticulum, Golgi apparatus. Eukaryortic cells like in humans possess a nucleus whereas bacteria and other prokaryotic cells do not have nucleus. In this essay will be focusing on the organelle nucleus. Nucleus is the most important organelle in the cell.

It appears in an oval shape as shown above and averages 5µm in width. It often lies in the centre of a cell. The nucleus possess nuclear envelope, nuclear pores, nucleoplasm, nucleolus and chromosomes. The nuclear envelope is composed of two membranes that discrete the nuclear contents from the enclose cytoplasm. The membranes are known as the inner and outer nuclear membranes. These membranes are away from each other by 20nm to 40nm. The outer membranes is connected to the endoplasmic recticulum, however the gap between the inner and outer membrane is directly attached with the lumen of the endoplasmic recticulum. The outer membrane has identical role to the membranes of the endoplasmic recticulum and has ribosomes attached to its cytoplasmic surface. In comparison, the inner membrane carry proteins that are particular to the nucleus. The main role of the nuclear membranes is to act as barriers that discrete the contents of the nucleus from the cytoplasm. Beneath the inner nuclear membrane is the nuclear lamina. The nuclear lamina is a fibrous network that gives structural support to the nucleus. it consist of 60 – 80kd (kilodatlon) fibrous proteins called lamins, along with connected proteins. In mammal cells, there are three lamin genes which codes for atleast seven recognisable proteins. The lamins bind to specific inner nuclear membrane

protein such as emerin, mediating their attachment to the nuclear envelope and finding and arranging them within the nucleus. The nuclear lamina also attaches to chromatin through histones as well as other chromatin proteins. Lamins also extend its network throughout the interior of the nucleus. nuclear proteins that play a role in DNA synthesis, transcription or chromatin modification are known to attach to lamins.

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The nuclear pores are the only channels in which molecules can pass through from the nucleus to the cytoplasm. In other words the nuclear pores regulate the movement of substances from the nucleus to the cytoplasm. The nuclear pores is a huge structure with a width of about 120nm. The nuclear pores are composed of proteins, small molecules pass through the pores freely in either direction. However large molecules such as RNAs are not able to move through the pores so these large molecules move through the central pore of the nuclear pore complex by an active process.

The nucleoplasm is the matrix found inside the nucleus. The nucleolus is the most stricking out nuclear body as it is the site of rRNA transcription and processing aspects of ribosome assembly. It is a thick, oval shaped structure inside the nucleus. Each nucleolus posses a nucleolar organizer that is composed of chromosomal regions that comprises direction for making rRNA. Proteins that are required to make ribosomes are manufactured in the cytoplasm of the cell and transported into the nucleolus. Ribosomal RNA and proteins are then brought together into ribosomal subunits that exit the

nucleus through the nuclear pores. Nucleolus vanish when a cell divides and restores after division is complete.

Chromosomes are found in the form of DNA and protein molecules called chromatin. Chromosomes become visible as distinct threadlike complex when cell undergoes division. Chromatin are of two kinds euchromatin and heterochromatin. During interphase of mitosis (cell division) heterochromatin is highly condensed and is transcriptionally inactive. In contrast euchromatin is less condensed and spread throughout the nucleus. chromosomes play a major role in controlling gene expression.

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To sum up the nucleus perform various functions including storing hereditary information in the form of long and thin DNA strands(chromatin). It is also stores protein and RNA in the nucleolus. In addition it is the site for transcription where mRNA is formed for protein synthesis. Nucleus exchange hereditary material between the nucleus and the rest of the cell. It produces ribosomes in the nucleolus and when cell divides, the chromatin arrange into chromosomes.

http://www. buzzle. com/articles/cell-nucleus-structure-and-functions. html

The internal arrangement of the nucleus is further shown by the localisation of most nuclear methods to recognisable regions of the nucleus. most essential enzymes and other proteins of the nucleus are found to be separated into subnuclear bodies that possess a low-density, spongy-like model that permits macromolecules from the rest of the nucleus to move in

and out. In mammal cells, the nuclei consists of assembled sites of DNA replication within which the replication of many DNA molecules takes place.

Cells stores information in the form of DNA and most of it is found in the nucleus. When cell undergoes division the information kept in the form of DNA must be reproduced and passed complete to the two daughter cells. DNA can make exact copies of itself in a process called replication. DNA molecules compose of sequences of nucleotides which consist of sequences the coded directions for producing the proteins wanted by the cell. The nucleus however controls proteins synthesis by transcribing its material in messenger RNA molecules. Messenger RNA goes into the cytoplasm where proteins are produced.

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