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Opinion Article

Structural and Functional Characteristics of Mitochondria

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DESCRIPTION

Mitochondria are membrane-bound cell organelles (mitochondrion, singular) that produce the majority of the chemical energy required to power the cell's metabolic activities. Adenosine Triphosphate (ATP), a tiny molecule, is used to store the chemical energy generated by the mitochondria (ATP). Cellular organelles called mitochondria transform the energy from food into a form that can be utilised by cells. There are hundreds to thousands of mitochondria, and they are found in the fluid around the nucleus (the cytoplasm). The synthesis of cellular ATP through oxidative phosphorylation is one of the mitochondria's primary functions, but they also perform and ultimately have roles in various metabolic pathways, ion homeostasis, apoptosis and programmed cell death, as well as the generation and consumption of ROS. Plants and fungi have one of three distinct types of mitochondrial genomes. The first type is a circular genome with introns (type 2) that can be anywhere between 19 and 1000 kbp in length. The second genome type is a circular genome with a plasmid-like structure (1 kb) and is between 20 and 1000 kbp in size (type 3).

The structure of the mitochondria

The size of mitochondria, which is frequently between 0.75 and 3 micrometers, makes them difficult to see under a microscope unless they are labelled. They have two membranes, an outer and an inner one, in comparison to other organelles, which are tiny organs within the cell. Different membranes serve various purposes. Each of the several compartments or sections that make up mitochondria performs a specific function. The following are some of the major regions:

Outer membrane : The outer membrane is permeable to small molecules. Porin proteins, which create channels to allow proteins to cross, are present in this outer region. A large number of enzymes with a diverse range of functions are also present in the outer membrane. The space between the inner and outer membranes is known as the intermembrane space. The inner membrane holds proteins with various functions are stored. The inner membrane is impervious to most molecules because it contains porins. Only particular membrane transporters are able to transport molecules through the inner membrane. The majority of ATP is produced in the inner membrane.

Cristae: These are the inner membrane's folds. They expand the membrane's surface area, expanding the amount of space available for chemical processes. The space inside the inner membrane is known as the matrix. Containing hundreds of different enzymes, it is important for the creation of ATP. Here, mitochondrial DNA is stored .The quantity of mitochondria varies between different types of cells. For instance, liver cells can have more than 2,000, but mature red blood cells have zero. Mitochondria are more prevalent in cells that require a lot of energy. Mitochondria occupy about 40% of the cytoplasm in cardiac muscle cells. Although mitochondria are frequently depicted as oval-shaped organelles, they are continually dividing (fission) and joining together (fusion).

CONCLUSION

The "powerhouses" of cells, mitochondria, are unusual organelles since they have a little genome of their own and are surrounded by a double membrane. They also divide through simple fission, not through the cell cycle. As a result these organelles are ever-changing networks. Also, the mitochondria in sperm cells are coiled in the midpiece and supply energy for tail motion.

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