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Short Communication

Electron Transfer Reactions in Eukaryotic Chloroplasts and its Synthesis of ATP

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DESCRIPTION

Endosymbiotic bacteria serve as the source of the bioenergetic organelles mitochondria and chloroplasts in eukaryotic cells. The Electron Transport Chains (ETCs) are similar to those of bacteria that is free-living, but they were specifically designed for energy conversion inside the host cell. Both reductive and expanding actions occur concurrently in mitochondria and chloroplasts. On the one hand, eukaryotes lost bacterial complexes along with a corresponding loss of metabolic flexibility. On the other hand, new complexes have been introduced, new subunits have been added to existing bacterial complexes, and complicated folding patterns of the thylakoid and mitochondrial inner membranes have emerged. Eukaryotes independently devised some bacterial mechanisms, such as alternate pathways for quinol oxidation or the utilization of diverse anaerobic electron acceptors [1].

Understanding of the structure and function of eukaryotic PSI was considerably improved by the recent modifications to the pea PSI crystal structure. In multiple outstanding recent assessments, the structure of the PSI core and the purpose of its constituent parts have been carefully studied [2].

A chain of molecules that readily collect or donate electrons makes up the electron transport chain. Electrons are pushed across a membrane in a given direction by passing step-by-step through them. This is associated with hydrogen ion migration. This implies that hydrogen ions move along with electrons moves. When hydrogen ions are pushed into the lumen, the thylakoid's interior, ATP is produced. Ions of hydrogen are positively charged. The hydrogen ions desire to avoid one another because like in magnets, opposite charges repel one another [3]. Through ATP synthase, a membrane protein, they are able to leave the thylakoid. Like water flowing through a dam, they provide the protein power by passing through it. ATP is produced as hydrogen ions pass through proteins and down the electron transport chain. This is how plants convert solar energy into usable chemical energy [4].In prokaryotes, ATP production takes place on the plasma membrane. However, the plasma membrane is only used for transport in eukaryotic cells. Instead, ATP is produced by specialized membranes found inside organelles that convert energy. Both plastids, most notably chloroplasts, which are found only in plants, and mitochondria, which are membrane-enclosed organelles, are found in the cells of almost all eukaryotic species (including fungi, animals, and plants). The amount of internal membrane seen in mitochondria and chloroplasts is the most notable morphological characteristic in electron micrographs [5]. The framework for a complex series of electron-transport processes, which generate the majority of the cell's ATP, is provided by this interior membrane [6].

CONCLUSION

The light-dependent processes goal is to transform solar energy into NADPH and ATP, which are chemical carriers that will be utilized in the Calvin cycle. Two photosystems are present in eukaryotes and some prokaryotes. Photosystem II (PSII), the first, was given its name based on the order in which it was discovered rather than the order in which it performs its job. Energy from sunlight is utilized to extract electrons from water once a photon strikes the reaction center of Photosystem II (PSII). The electrons move to Photosystem I (PSI), which converts NADP+ to NADPH, through the chloroplast electron transport chain. Energy from the electron feeds proton pumps in the membrane that actively propel hydrogen ions against their concentration gradient as it travels from stroma into the thylakoid space along with electron transport chain.

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