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Structural Importance of DNA

Xu Yang*

Department of Medical Biology and Genetics, Peking University First Hospital, China

Abstract

The DNA is said to be the hereditary material carrier of the any living beings. DNA stands for the deoxyribonucleic acid and is nearly same in every cell of the human body. It's one of the greatest ability is to replicate and form the new strands which are complementary to the parent DNA strand or the template DNA. The location of the DNA is always determined to be in the nucleus but some small amount is also present in the mitochondria and in plants, it's also present in the choroloplast. The mitochondria is the cell organelle which is responsible for the energy production in the cell whereas, chloroplast are the cell organelle in plants which are responsible for the pigmentation of the plant leaves in turn involved in the photosynthesis.

Keywords: DNA • Photosynthesis • Replication

Introduction

The genetic details are coded in the DNA as per the four nitrogenous Bases which are the: adenine (A), guanine (G), cytosine (C), and thymine (T). The DNA of the human consists of 3 billion bases which are 99 percent same in all human beings. The sequencing of the nitrogenous bases is responsible for the genetic information of an individual.

It is very important to know that the pairing of the bases have its own rules and regulations for the arrangement of its sequences that is its always necessary for the cytosine to get paired with the guanine by forming triple bond for its stability and adenine always need to pair up with the thymine by forming the double bond for its stability. However, there is an exception for the RNA molecule as in the RNA molecule adenine binds with the uracil for its molecular stability via the double bond. The overall molecule of the DNA consists of the nitrogenous bases, sugar and the phosphate group which are referred as the nucleotides. The DNA are said to have double helical structure which are formed via the two long strands of the nucleotide in the spiral form. This structure is somewhat in the ladder form where all the nitrogenous bases are face inwards of the double helical structure of the two long nucleotides forming the helix, simultaneously, the sugar and phosphate forms the backbone of the helical nucleotide; as in forming the sidepieces of the ladder.

As it has already been mentioned that bases are the primary factor for the determination for genetic code of that is encoded for the DNA. And these bases are able to form the helical structure of the DNA due to its hydrophobic nature which leads to the development of the hydrogen bonding among the nitrogenous bases via the hydrophobic interactions. The two nucleotides responsible for the helical form of DNA is due to its two strands which runs opposite directions of the each other that is the 3'-5' prime direction. These two strands are twisted in such a manner leading to the formation of the right-handed coil in which each single turn consists of ten nucleotides. The distance of each from its center is 3.4 nm that is the pitch of the helix. Therefore, the distance comes out to be between each complementary cases held together via the hydrogen bond is 0.34 nm.

The coiling up these DNA strands leads to the formation of the chromosomes, and each pair of chromosomes consists of a single type of the DNA molecule. Thus, these arrangements of the helical structure of DNA results in the construction of 23 pairs for chromosomes in the cell's nucleus. The vital role played by the DNA in the process of the cell division can also not be ignored.

Thus, this commentary article discussed how a small DNA molecule is able to carry the genetic makeup of an individual that consists of primarily of 250-3 billion base pairs. Its comprises of the most of the particular single amino acids which are responsible for encoding the specific function for the protein that would be translated for that segment of the DNA. Different types of proteins can be formed depending on the three major structure that are involved in the folding of proteins that are secondary, tertiary and quaternary structure to form different proteins. DNA's one of the most recognized functions is its ability to replicate. Replication is a process in which the transferring of the genetic makeup takes place from one cell to its daughters cells and thus, maintaining the quality as well as the quantity of the DNA within the organism.

Conflict of Interest

We have no conflict of interests to disclose and the manuscript has been read and approved by all named authors.

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***Address for Correspondence:** Xu Yang, Department of Medical Biology and Genetics, Peking University First Hospital, China, E-mail: yang_xu@gmail.com*

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