OPEN ACCESS Freely available online

Advanced Techniques in Biology & Medicine

Short Communication

In Molecular Biology, A Short Communication on the Core Dogma of DNA

Liya Abebe*

Department of Science, Addis Ababa Science and Technology University, Addis Ababa, Ethiopia

INTRODUCTION

The process of converting DNA instructions into a functional product is known as the 'Central Dogma.' Francis Crick, the discoverer of the structure of DNA, initially proposed it in 1958. In layman's terms, it means that once "information" has been transmitted into protein, it cannot be retrieved. The transmission of information from nucleic acid to nucleic acid, or from nucleic acid to protein, in greater detail. Transfer from one protein to another or from one protein to a nucleic acid is conceivable, but it is difficult to transfer from one protein to another. The exact identification of sequence, whether of bases in nucleic acids or amino acid residues in proteins, is referred to as "information."

In the most frequent or broad example, the dogma provides a framework for understanding the transmission of sequence information between information-carrying biopolymers in living organisms. DNA and RNA (both nucleic acids) and protein are the three primary types of biopolymers. There are a total of 3×3 = 9 possible direct information exchanges between them. DNA and RNA (both nucleic acids) and protein are the three primary types of biopolymers. There are a total of 3×3 = 9 possible direct information exchanges between them. DNA can be duplicated to DNA (DNA replication), DNA information can be transferred into mRNA (transcription), and proteins may be produced using the information in mRNA as a template (translation). RNA replication, DNA synthesis utilising an RNA template (reverse transcription), and protein synthesis straight from a DNA template without the use of mRNA are all described by the special transfers. Protein copying from another protein, RNA synthesis using a protein's main structure as a template, and DNA synthesis using a protein's primary structure as a template are among the unknown transfers, none of which are predicted to occur naturally. DNA is found in chromosomes. Chromosomes are usually found in the nucleus of eukaryotic cells, although proteins are produced at ribosomes in the cytoplasm. How do DNA instructions reach the protein production location outside the nucleus? A different sort of nucleic acid is to blame. RNA, or ribonucleic acid, is the nucleic acid in question. RNA is a tiny molecule that can pass through the nuclear membrane's pores. It transports information from DNA in the nucleus to a ribosome in the cytoplasm, where it is subsequently used to put the protein together. In summary: - (DNA RNA Protein) - (DNA RNA Protein) - (DNA RNA Protein) - (DNA RNA Protein) [1].

When does the 'Central Dogma' come into play?

It is becoming evident that several elements of the fundamental doctrine are not fully correct as a result of current study. The role of non-coding RNA is now being investigated in study. Despite the fact that it contradicts the fundamental concept, it serves a useful purpose in the cell [2].

Replications of DNA

DNA is made up of two complementary strands that form a double helix. The double helix is the shape of a double-stranded DNA molecule, which is made up of two linear strands that run in opposing directions and twist together to create a molecule. These strands are split during replication. The technique of employing each strand of the original DNA molecule as a template for the synthesis of its counterpart is known as semiconservative replication. The new helix will be made up of an original DNA strand as well as a freshly synthesised strand as a consequence of semi-conservative replication. Cellular error-checking and proofreading processes provide near-perfect DNA replication fidelity [3].

Transcription of DNA

The act of transcribing information from a strand of DNA into a new messenger RNA molecule is known as transcription (mRNA). DNA retains genetic material in the nucleus of cells as a reference, or template, in a secure and stable manner. The pre-mRNA chain is processed by adding a 5' cap and a poly-A tail, followed by splicing. Alternative splicing happens when it is suitable, increasing the variety of proteins that a single mRNA can produce. The mature mRNA chain is the end result of the whole transcription process (which began with the creation of the pre-mRNA chain) [4].

Translation of DNA

A ribosome produces a particular amino acid chain, or polypeptide, by decoding messenger RNA (mRNA) outside the nucleus. After

***Correspondence to:** Liya Abebe, Department of Science, Addis Ababa Science and Technology University, Addis Ababa, Ethiopia, Email- liyaabebe@aastu.edu.et

Received: 2 September 2021; **Accepted:** 15 September 2021; **Published:** 21 September 2021

Citation: Abebe L (2021) In Molecular Biology, A Short Communication on the Core Dogma of DNA. Adv Tech Biol Med. 9:321. doi: 10.4172/2379-1764.1000321

folding into an active protein, the polypeptide executes its activities in the cell. The mature mRNA is transported to a ribosome and translated. The processes of transcription and translation may be connected together without apparent distinction in prokaryotic cells, which lack a nuclear compartment. Because the location of transcription (the cell nucleus) and the site of translation (the cytoplasm) are generally separated in eukaryotic cells, mRNA must be carried from the nucleus to the cytoplasm, where it may be bound by ribosomes. The ribosome reads the mRNA triplet codons, which generally start with an AUG (adenineuracilguanine), or initiator methionine codon, which is located downstream of the ribosome binding site [5].

REFERENCES

1. Sin C, Chiarugi D, Valleriani A. Quantitative assessment of ribosome drop-off in E. coli. Nucleic Acids Res. 20167;44(6):2528-2537.
2. Moran L. Basic concepts: The Central Dogma of molecular biology. Sandwalk. 2007.
3. Cooper S, Helmstetter CE. Chromosome replication and the division cycle of Escherichia coli Br. J Mol Biol. 1968;31(3):519-540.
4. Lia G, Michel B, Allemand JF. Polymerase exchange during Okazaki fragment synthesis observed in living cells. Science. 2012;335(6066):328-331.
5. Shapiro JA. Evolution: a view from the 21st century. Pearson education. 2011.