DNA through the Process of Protein Synthesis

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**DNA Structure and Genetic Characteristics**

DNA is an abbreviation of Deoxyribonucleic Acid that is a molecule made up of nucleotides. Nucleotides are composed of a phosphate group that is a phosphorus-containing region, deoxyribose that is a sugar group based on carbon, and a nitrogenous base that is a nitrogen-containing region. A nucleotide is made up of two chains that coil around each other in the form of a double helix. They carry genetic information needed by an organism for development, reproduction, growth, and all the functions of the body. This implies that genetic characteristics are associated with the DNA molecules. Genetic characteristics are the hereditary characteristics that offspring inherit from their parents. These characteristics include the physical structure and related attributes, biochemistry of the body, and behavior, though the behavior is inherited to a little extent. During the reproductive process, both parents contribute to the offspring in terms of genetic characteristics. However, it is not the fact that offspring is a copy of its parents. Instead, almost half the genetic characteristics of an individual or organism are transferred to the offspring. The two halves, each originating from a parent, combine to make a complete whole. Further, it is essentially important to note that new patterns of genetic coding or a combination of nucleotides emerge from the combination of two halves coming from each parent. The zygote thus formed undergoes a series of developmental changes and ultimately transforms into a grown-up individual, which demonstrates new characteristics although it demonstrates traits of both parents as well. In humans, a body cell contains a set of 46 chromosomes (containing complete information for the organism’s body structure and function for the whole life), and reproductive cells contain 23 chromosomes. Therefore, each parent contributes a set of twenty-three chromosomes to the formation (a whole new combination) of a set of forty-six chromosomes of zygote.

**Steps in the process of Protein Synthesis**

Protein synthesis is one of the most important functions of a cell. The entities involved in protein synthesis are DNA, RNA, Ribosomes, and Plasma proteins. DNA’s primary role is to direct the process of protein synthesis. Protein synthesis starts with the unzipping of DNA in the nucleus. Double-stranded nucleotides are converted to single-stranded nucleotides constituting mRNAs, which contain DNAs’ message for protein synthesis. This process is referred to as *Transcription*. Complementary information from within the DNA is transcribed on to the mRNAs (messenger RNAs) who are responsible to carry this information from the nucleus to the ribosomes present outside, which are the sites or factories for synthesizing new proteins. The mRNAs get attached to ribosomes and the process of *Translation* starts (Simon, Dickey, Hogan, & Reece, 2015). It entails decoding DNA message to specify what type of proteins would be made by giving directions about the sequence of the polypeptide chain. A codon (referred to three nucleotides) is read, proper amino acids are fetched from Plasma to connect with the codon. The tRNAs do the job of transporting amino acids from Plasma to ribosomes. When two amino acids reach a ribosome, a connection builds between them named peptide bond. The next peptide bond is formed when two other amino acids get attached to the ribosome. This process is called *Elongation*. It refers to building up the amino acids as directed by DNAs’ message. A series of peptide bonds gives rise to a polypeptide chain that is specific in its characteristics. The process is stopped when some mRNA (uracil involved) gives out a stop signal, referred to as *Termination.* Consequently, a new polypeptide chain is formed.

**DNA to be Responsible for Ultimate Expression of Characteristics in an Organism**

DNA also referred to as the genetic material is responsible for carrying information that controls the overall biological issues of an individual. This information is called genetic information. DNA creates the genetic code as well which is a set of rules used in translating the genetic information stored in DNA into proteins, which ultimately direct functions of cells (Plomin, 2019). Cells receive instructions from the brain, which response to the external as well as internal stimuli. The cell functions are regulated by the brain, internal regulatory system of the body, and stimuli from the environment. An individual's characteristics are controlled by the internal and external (biological, psychological, or environmental) stimuli. These stimuli are responded at the cellular level by DNA, which releases relevant responding information for creating respective proteins to regulate cell functions accordingly. Therefore, it can be concluded that DNA is responsible for the final expression of characteristics in an individual. The process of protein synthesis is directly associated with the ultimate expression of characteristics in the individual. DNA works as the potential control center that automatically regulates cell functions by adjusting protein types and amounts it makes.

**Effects of Interference in Protein Synthesis on Cellular and Bodily Processes**

Proteins have been proved by researches to be responsible for dictating cell functions and controlling the biological (and behavioral as well, to some extent) characteristics of an organism. This implies that protein synthesis is a very critical process in the cell. Interference occurring in protein synthesis disrupts a cell's proper functioning, eruption of disease phenotypes, and other disturbances. Proteins contribute to building the body structure, i.e., making parts of the body. Proteins help in supporting the immune system of the body. Errors occurred protein synthesis can lead to the development of undesired body structures or a decrease in immunity. Interference in protein synthesis occurs at all stages from the transcription of genetic information to the ultimate folding of functional proteins. The genetic code determines the unique type of every polypeptide chain, that is, the sequence of amino acids arranged to make polypeptides. When an interference occurs in the nucleotides’ sequence in the translational stage, it affects the sequence of amino acids in the ultimate polypeptide chain by placing a different amino acid in place of the desired one.

**Poor Nutrition Disrupts Important Body Functions**

Nutrition can have positive or negative effects on the body functions of an individual, depending upon the quality and quantity of nutrition provided. However, the study of nutritional effects on body functions can be done using different perspectives. One of the approaches used in studying the effects of nutrition is to consider the process of protein synthesis being affected by poor nutrition, which ultimately affects the body functions. Several body functions are regulated by enzymes, which are made up of amino acids. The body has different glands in its various parts, which release enzymes as their products. These enzymes help in increasing the speeds of chemical reactions taking place in almost all the cells of the body. Enzymes help in regulating the systems of the body, such as helping in digestion and expediting the process of metabolism. Enzymes also assist cells to communicate with one another, as well as assist in controlling cell growth.

Poor nutrition can disrupt protein synthesis, and erroneous enzyme production can lead to disturbed body functions. Diseases or dysfunctions caused due to the enzymes imbalance can result in poor nutrition. Lack of proteins means lack of amino acids, and this can result in weak immune system, poor digestion, depressive disorders, fertility problems, inability to focus on something, growth problems in children, and many more. Enzymes are needed by the body in specific amounts for particular functions to be performed well. Poor nutrition will affect enzymes concentration produced in protein synthesis processes and used in chemical reactions that will ultimately affect the functionality of body organs.

Works Cited

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