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Editorial

Molecular Bio-Engineering in Replication of DNA Molecules

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INTRODUCTION

Bio molecular engineering is an application of chemical engineering, following the principles of engineering it manipulates the main key molecules. Carbohydrates, lipids, proteins and nucleic acids are manipulated in relation to their form, function and properties and in relation to their applicability. The fundamentals of engineered molecules are also focussed in cell signalling, cellular growth kinetics, engineering of biochemical pathways etc. There are different methods of manipulation for every molecule respectively as each biomolecule is different.

Primary Biomolecules

Proteins

Proteins are made up of amino acids and peptide bonds linked chains. Their structure is categorised into four levels; the primary level, which refers to the back bone sequence of the amino acid. The secondary level structure emphasises small confirmations resultant of the inter-molecular hydrogen bonding between amino acid chains. The tertiary protein structure allocates overall arrangement of the molecules and their folding process. At the last quaternary protein structure is a group of bound tertiary proteins. These four distinct levels of proteins provide wide opening for manipulation and adjustment. Enzymes which are the catalysts of the biochemical reactions are the proteins that are mainly brought attention upon for manipulation.

Carbohydrates

Carbohydrates are the polymers, also called as polysaccharides made up of chains of glucosidic bonds through which simple sugars are connected. A monosaccharide consists of 5-6 carbon rings which contain carbon, hydrogen and oxygen in 1:2:1 ratio. The monosaccharides linked together to form di, oligo and polysaccharides. Cellulose is one of the polysaccharide made up of 1-4 beta linkages of the glucose monomers. Glucose is a great source of sugar. Starch is a polysaccharide made up of Alpha 1-4 linkage of glucose monomers.

Nucleic Acids

Nucleic acids are the macromolecules of two biomolecules, DNA and RNA which are the genetic code that make life possible. Manipulating these biomolecules and their forms brings a significant change in the macromolecules functioning and expression. The genetic code is determined by the sequence of bases.

Lipids

Lipids are made up of glycerol derivatives bonded with fatty acid chains. Lipids are principle energy storing molecules. Lipid engineering mainly deals with the manipulation of lipid membranes and encapsulation. Manipulating lipids gains the structural and energy control when the molecules are engineered by utilizing their own thermodynamic characteristics and encapsulation properties.

POLYMERASE CHAIN REACTION (PCR)

Polymerase chain reaction technique is employed to make a duplicate piece of DNA molecule using various orders of magnitude. PCR execute thermal cycles that include a series of heating and cooling cycles in addition to DNA primers and polymerases to create a replica of DNA fragment selectively. A number of biomolecular engineering strategies have played a really important role within the development and practice of PCR. The foremost common method of primer synthesis is by the phosphoramidite method. This method includes the biomolecular engineering of various molecules to achieve the specified primer sequence. The foremost prominent biomolecular engineering technique observed during this primer design method is that the

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initial bioimmobilization of a nucleotide to a solid support.

ENZYME-LINKED IMMUNOSORBENT ASSAY (ELISA)

ELISA is an assessment to identify presence of certain substances by using the principles of antibody-antigen recognition. There are three primary tests in ELISA which include; indirect ELISA, sandwich ELISA and competitive ELISA. All the three tests depends on the fact that antibody have an affinity for one specific antigen alone. In addition, these antibodies and antigens can be attached to certain enzymes resulting in a colorimetric creation that indicates the presence of the specific antibody or antigen of interest. ELISA is mostly used as a diagnostic test in detecting the HIV antibodies in blood samples, in pregnancy test to identify the presence of human gonadotropin molecules, in TB patients to recognise the presence of disease causing mycobacterium tuberculosis antibodies in blood samples. Furthermore, this assay is used in testing the presence of illegal drugs in serum samples of the patients.

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