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Commentary

Different Types of Oligosaccharides and Their Functions

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DESCRIPTION

An oligosaccharide is a saccharide polymer that contains a few (usually two to ten) monosaccharide's. The word oligosaccharide comes from the Greek words o olgos, "a few," and sácchar, "Sugar" (simple sugars). Numerous roles for oligosaccharides include cell adhesion and cell recognition. Normally, oligosaccharide chains are found as glycans, which are joined to lipids or to the side chains of suitable amino acids in proteins by N- or O-glycosidic linkages. Pentasaccharides that are N-linked oligosaccharides are always joined to asparagine by a beta link to the side chain's amine nitrogen. As an alternative, O-linked oligosaccharides are typically joined to threonine or serine on the side chain's alcohol group. Not all oligosaccharides found in nature are found as parts of glycoproteins or glycolipids. Some appear as storage or transportation carbohydrates in plants, including the raffinose series. Others, such maltodextrins or cellodextrins, are produced when bigger polysaccharides like starch or cellulose are broken down by microorganisms.

Glycosylation

In biology, glycosylation refers to the process of covalently attaching a carbohydrate to an organic molecule to produce structures like glycoproteins and glycolipids.

Linked oligosaccharides N

Asparagine is attached to an oligosaccharide during N-linked glycosylation by a beta bond to the side chain's amine nitrogen. N-linked glycosylation takes place concurrently with or cotranslationally with the translation of the proteins. Because sugars are hydrophilic, it is thought that N-linked glycosylation, which is added cotranslationally, influences how polypeptides fold. Every N-linked oligosaccharide is a pent saccharide, which is composed of five monosaccharides.

Oligosaccharides with an O-link

The hydroxyl group of the side chain is where oligosaccharides that take part in O-linked glycosylation are connected to threonine or serine. In the Golgi apparatus, where monosaccharide units are added to a whole polypeptide chain, O-linked glycosylation takes place.O-glycosylation occurs on extracellular and cell surface proteins. The secondary and tertiary structures of the polypeptide define where glycosyltransferases will add sugars to O-linked oligosaccharide glycosylation sites.

Biomolecules with glycosylation

By definition, glycoproteins and glycolipids are covalently linked to carbohydrates. They are extraordinarily numerous on the cell surface, and interactions between the cell stable.

Glycoproteins

Glycoproteins feature unique oligosaccharide structures that have a considerable impact on a number of their characteristics, including antigenicity, solubility, and protease resistance. As cell-surface receptors, cell adhesion molecules, immunoglobulin's, and tumor antigens, glycoproteins are important.

Glycolipids

Glycolipids are essential for changing how membrane proteins those act as receptors and for identifying cells. Glycolipids are lipid molecules joined to oligosaccharides in the lipid bilayer. They may also serve as cellular signaling and recognition receptors. The oligosaccharide's head serves as a binding partner in receptor activity. The binding mechanisms of receptors to the oligosaccharides that are exposed or presented above the surface of the membrane are influenced by the makeup of those oligosaccharides. Because glycolipids' binding mechanisms are so varied, they are essential to numerous biological activities. Pathogens use as a target as a point of contact and entry. For instance, research on the chaperone action of glycolipids in relation to HIV infection.

Functions

Cell identification: Both glycoproteins and glycolipids, which both aid in classifying different cell types, are found on the surface of all cells. Specific oligosaccharides can be recognized by lectins, or proteins that bind carbohydrates, and this knowledge is

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helpful for identifying cells based on oligosaccharide binding. The involvement of glycolipids in classifying blood types is a crucial illustration of oligosaccharide cell recognition. The glycan modification seen on the blood cell surface helps to identify the different blood types. Mass spectrometry can be used to see these. The non-reducing ends of the oligosaccharide are where the oligosaccharides on the A, B, and H antigens are located.

Cell adherence: Many different types of cells make lectins, which are unique carbohydrates-binding proteins that work with oligosaccharides to mediate cell adhesion. A class of lectins called selectins mediates some types of cell-cell adhesion; including the adherence of leukocytes to endothelial cells. Endothelial cells can temporarily express specific selectins during an immune response in reaction to cell damage or injury. In response, a reciprocal engagement between the two molecules known as a selectin-oligosaccharide interaction will take place, enabling the white blood cell to assist in eradicating the infection or damage. Van der Waals forces and hydrogen bonding are frequently used to mediate protein-carbohydrate bonds.