Carbohydrates

Sugars->Polysaccharides

Carbohydrate, $(C\text{-}H_2O)_n$ = “Carbon + Water”

Carbohydrates = saccharides = sugar = -ose

1. Source of energy

2. Building blocks

3. Molecular interactions

Monosaccharides Can be divided in two big group

1. Aldose(aldehyde group -CHO) contain the carbonyl group bonded to at least one hydrogen atom.

2. Ketose(ketone group -CO-) contain the carbonyl group bonded to two carbon atoms.

Aldehydes and ketones are organic compounds which incorporate a carbonyl functional group, C=O.

Common monosaccharides

General formula: $(CH_2O)_n$

D-Ribose

D-Deoxyribose

D-Glucose

D-Mannose

D-Galactose

D-Fructose

Glucose

alpha-Glucose	cis isomer
beta-Glucose	trans isomer

cis: same side, trans: opposite

Common Disaccharides

Sucrose	glucose-fructose
Lactose	galactose-glucose
Maltose	glucose-glucose

Glycogen and Starch Are Mobilizable stores of Glucose

Complex Carbohydrates

Formed by linkage of monosaccharides

ex. Maltose, a Disaccharide: Two molecules of glucose are linked by an alpha-1,4-glycosidic bond to form the disaccharide maltose.

Glycoproteins

Glycoproteins are proteins covalently modified with a small amount of carbohydrate groups.

Many cell membranes proteins are glycoproteins, which involve cell adhesion and the binding of sperm to egg.

Many extracellular proteins are also glycoproteins, including proteins in the serum.

The diversity and complexity of the carbohydrate units of glycoproteins suggest that they are functionally important.

Carbohydrates are information-rich molecules that guide many biological processes.

The diverse carbohydrate structures displayed on cell surfaces are well suited to serve as sites of interaction between cells and their environments.

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