

Glycosylation

Glycosylation

Glycosylation is the attachment of a chain of glycans that takes place on the endoplasmic reticulum and in the Golgi apparatus. This is a post-translational modification of proteins, but sometimes attachment is co-translational. According to the type of binding by which carbohydrates are bound to proteins, we divide glycoproteins into N-glycoproteins, O-glycoproteins and now also C-glycoproteins and phosphoglycoproteins.

Synthesis of N - glycans

The synthesis of N-glycans (N-linked oligosaccharides) takes place in three steps:

1. formation of nucleotides with bound carbohydrates

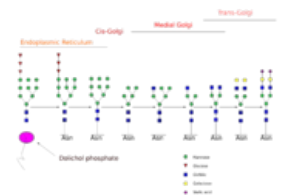
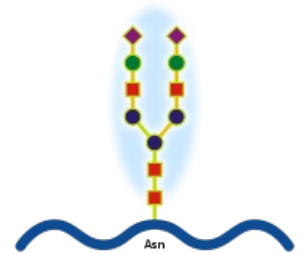
- The formation of nucleotides with bound carbohydrates takes place in the cytosol, mainly guanosine diphosphate-mannose (GDP-Man), also uridine diphosphate-glucose (UDP-Glc) and UDP-N-acetylglucosamine (UDP-GlcNAc) with subsequent attachment of GlcNAc and Man units to dolichol phosphate and forming oligosaccharide structures into the endoplasmic reticulum.

2. assembly

- Assembly (assembly, assembly, assembly) takes place in the ER - further addition of Man and Glc.

3. targeting

- In this phase, this precursor is transported to the emerging protein, followed by the final processing of the glycan in the Golgi apparatus, where various carbohydrate units are removed and added.



Synthesis of N - linked glycoproteins

N-glycosylation Two-step synthesis :

1. synthesis and transfer of PP-dolichol oligosaccharide (pyrophosphoryldolichol);
2. processing of an oligosaccharide chain (processing) that is already bound to the protein. Glycosylation in ER and GA

The oligosaccharide pyrophosphoryldolichol plays an important role in the synthesis of N-linked glycoproteins. It is formed from dolichol, which is a polyisoprenol in the ER membranes of eukaryotes. Dolichol is phosphorylated by dolichol kinase to dolichol phosphate-Dol-P. Activated sugars (donors of the first seven sugars) and dolichol- β -saccharides (donors of the last seven sugars) are gradually bound to the terminal phosphate. The oligosaccharide chain thus formed on the pyrophosphoryldolichol backbone is transferred en-bloc to the protein to form an N-glycoside bond. This reaction is catalyzed by the membrane enzyme oligosaccharide transferase. Glycosylation occurs at the Asn residue. The acceptors are secreted proteins, integral membrane proteins, but rarely proteins found in the cytosol.

There are 3 main classes of N-linked glycoproteins:

- complex;
- hybrid;
- high mannose type.

All types have the same pentasaccharide ((Man) 3 (GlcNAc) 2), but differ in the structure of the outer branches.

Links

Related Articles

- Glycoproteins
- Posttranslational glycosylation of proteins

References

- FERNANDES, John. *Diagnosis and treatment of inherited metabolic disorders*. 1st edition. Prague: Triton, 2008. pp. 576-580. ISBN 978-80-7387-096-6.

