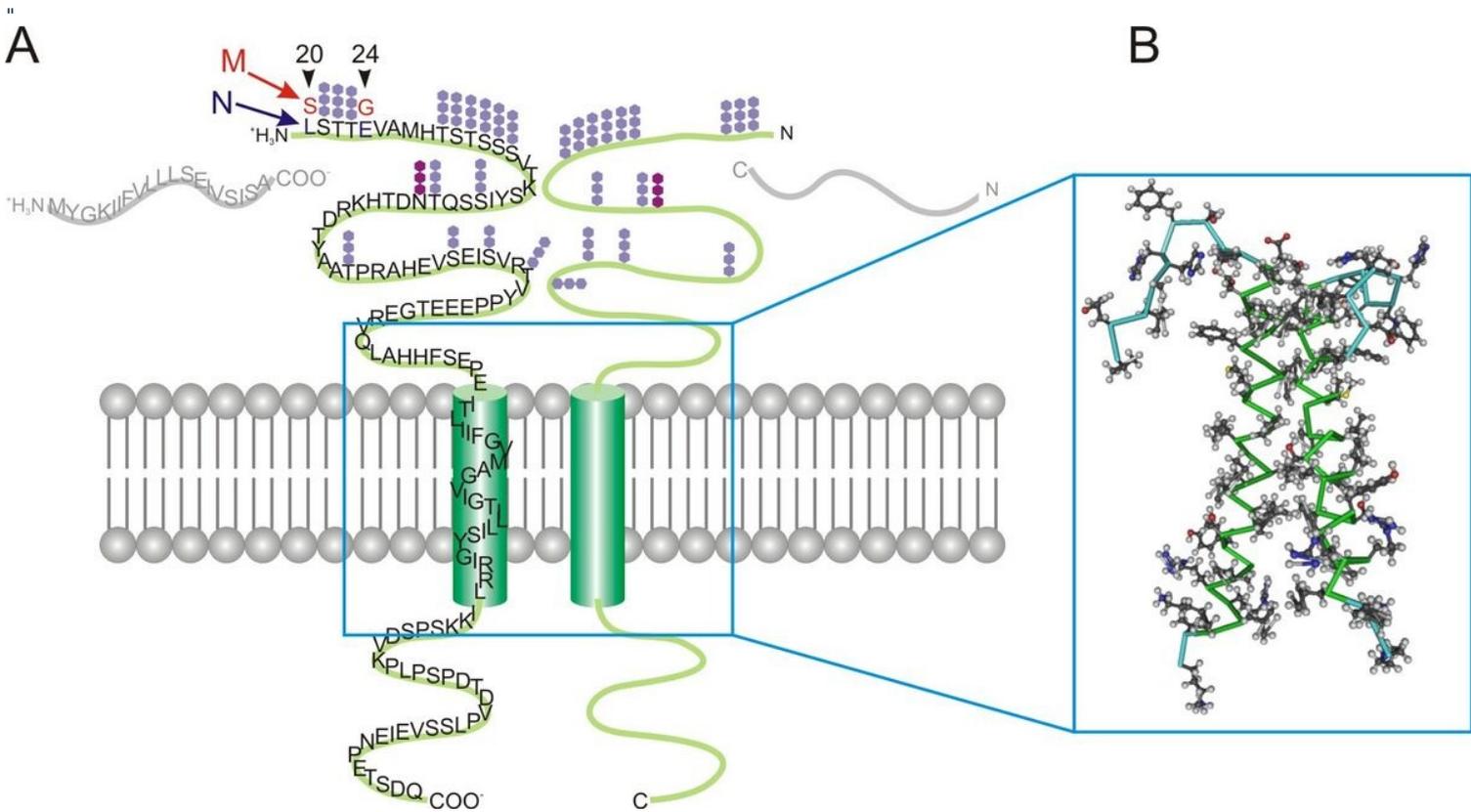


# MN system

Blood group **MN** is determined by a gene for glyophorin A (GYPA gene, GPA protein). Allele M corresponds to GPA with serine at position 20, while the N allele has leucine at position 20. Position 20 is in the mature GPA at the N-terminus, as the first 19 amino acids form a signal peptide that gets spliced during the passage through the endoplasmic reticulum. N-terminus thus contacts the extracellular environment. Both serine (M) and leucine (N) alleles are expressed and appear on the red blood cell where they can be detected by specific antibodies. That means that in heterozygotes MN we can detect both allele variants (M+ and N+). As the alleles are codominant, the blood group will be MN. Glycophorin B is very closely related to glyophorin A, whose polymorphisms are manifested as either blood group S or s. The similarity of the GYPA and GYPB genes can result in the formation of a fusion gene by the mechanism of unequal crossing-over. This leads to creation of other very rare blood groups. This leads to the creation of a whole set consisting of M, N, S, s and other rare alleles, which are referred to as the MNSs or MNS system. (see the overview at Intl. Soc of Blood Transfusion ([http://www.isbtweb.org/fileadmin/user\\_upload/WP\\_on\\_Red](http://www.isbtweb.org/fileadmin/user_upload/WP_on_Red))).



Picture:  
 A. Amino acids in single letter code. Extracellular domain above. The blood group M (red) or N (blue) is mainly determined by the amino acid at position 20 (however, position 24 is also different). The numbering is based on the initiator methionine, which is part of a 19-amino acid signal peptide that is cleaved off and degraded in the endoplasmic reticulum already (gray). The extracellular domain of glyophorin A is heavily glycosylated (blue hexagons = O-glycosylation on serine or threonine, purple hexagons N-glycosylation on asparagine. Symbols are not exact - carbohydrates are usually longer, branched and may not be the same). Glycophorin forms a dimer by association of membrane alpha-helices (St. blue rectangle, helices are represented by green cylinders), the 3D structure of the membrane part is known (B)

## Odkazy

- ws:MN systém

## Použitá literatura

Kategorie:Genetika Kategorie:Biologie