

| A active glycoprotein | Structural verified structures                                                                         | References           |
|-----------------------|--------------------------------------------------------------------------------------------------------|----------------------|
| O-linked *            | GaINAc2Fucn2[Galβ4GlcNAcβ5]NeuAc2-3Galβ3GalNAc Ser/Thr                                                 | Prodhon et al., 2008 |
| N-linked *            | GlcNAc4[GalNAcβ3Fucn2][Galβ4GlcNAcβ2Manβ5]GlcNAc2-6Galβ4GlcNAcβ2Manβ5[3]Manβ6GlcNAcβ4Fucn5GlcNAc-6-Krn | Prodhon et al., 2010 |
|                       |                                                                                                        |                      |

| A active glycoprotein    | Glycan epitope           | Internal repeating structure | Precursor                            | Reference                                                             |
|--------------------------|--------------------------|------------------------------|--------------------------------------|-----------------------------------------------------------------------|
| O-linked<br>core?        | GaHAc3/3'Hex2[Ga]G4G4Kd2 | ->[1]G4[6]G4Kd2,1            | ->G4Kd3,1,6,4Kd4<br>Fru3G4Kd6-4n     | Claessens & Holman, 1989<br>Ferre et al., 1976, 1989                  |
| O-linked<br>core?        | GaHAc3/3'Hex2[Ga]G4G4Kd2 | ->[1]G4[6]G4Kd2,1            | ->G4Kd3[Ga]G4G4Kd3[Ga]<br>Ac-Ser/Thr | Claessens & Holman, 1989<br>Jurek et al., 1988<br>Jurek & Kubic, 1988 |
| Type 3 ***<br>Multi-type | GaHAc3/3'Hex2[Ga]G4Kd1   |                              | ->GaHAc3-Ser/Thr                     | Claessens & Holman, 1989<br>Ferre et al., 1976                        |

<sup>\*\*\*</sup> Probably existed in minor amount on glycophorin A. Other glycoproteins in the red cell membrane do not express A type A.

## Description

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A further important distinction between glycoproteins and glycolipids is the former is immobile in the membrane, while the latter is able to move freely about in the membrane. The impact and consequences of this mobility difference are not known, but it has the potential to impact on biological interactions with antibodies and micro-organisms. Despite protein glycosylation being dominant on red cells, the actual structural identities of blood group glycoproteins isolated from red cells is very poorly resolved. Extensive analysis of the literature on blood group A glycoproteins, conclusively identified in the red cell membrane, only a few structurally identified examples were found (Table 2). Most of the blood group A glycoproteins structurally resolved have been described in other tissues/secretions Morgan & Watkins, 2000, and whether these exist on the red cell membrane is not known. Recently the existent of ABO blood group antigens in human glycophorin-A on red cells been reported Podbielska & Krotkiewski, 200. However, clearly, there is a major lack of understanding blood group A glycosylation of the red cell membrane.

A. Identified red cell blood group A glycoproteins

| A active glycoprotein | Structural verified structures                                                                           |
|-----------------------|----------------------------------------------------------------------------------------------------------|
| O-linked *            | GalNAcα3(Fucα2)Galβ4GlcNAcβ6[NeuAcα2-3Galβ3]GalNAc                                                       |
| N-linked *            | GlcNAcβ4[GalNAcα3(Fucα2)Galβ4GlcNAcβ2Manα3(6)][NeuAcα2-6Galβ4GlcNAcβ2Manα6(3)]Manβ4GlcNAcβ4(Fucα6)GlcNAc |
|                       |                                                                                                          |

B. Partially identified red cell blood group A glycoproteins

| A active glycoprot       | Glycan epitope               | Internal repeating structure       | Precurs                                                      |
|--------------------------|------------------------------|------------------------------------|--------------------------------------------------------------|
| N-linked **<br>general   | GalNAcα3(Fucα2)Galβ4GlcNAcβ1 | →[3(6)Galβ4GlcNAcβ2,] <sub>n</sub> | →(Manβ3,6,4) <sub>2-3</sub> GLcNAcβ2(GlcNAcβ6(Fuc)GlcNAc-Asn |
| O-linked **<br>General?  | GalNAcα3(Fucα2)Galβ4GlcNAcβ1 | →[3(6)Galβ4GlcNAcβ] <sub>n</sub>   | →Galβ3(Galβ4GlcNAcβ6)GlcNAcβ2Ac-Ser/Thr                      |
| Type 3 ***<br>Mucin-type | GalNAcα3(Fucα2)Galβ3         |                                    | → GalNAcα1-Ser/T                                             |

\* A active glycoproteins found on glycophorin A  
\*\* May also be sialylated, thus have *N*-Acetylneuraminic acid groups attached.  
\*\*\* Probably existed in minor amount on glycophorin A. Other glycoproteins in the red cell membrane do not exp

Table 2. Examples of blood group A glycoproteins identified or proposed to be present in the red cell membrane.

Category

- 1. News