Introduction to Blood Group

Description

The ABO(H) system although it is probably the oldest and most typed for human blood group system, yet from many perspectives, it is still poorly understood. The antigens of this system are sugar chains (glycans), which are present in red cell membranes, but also exist on most other non-erythroid cells, as well as in tissues/secretory fluids of humans and anthropoid apes Oriol, 1987Oriol et al., 1986. Due to this diverse distribution, they are better described as histo-blood group antigens rather than simply blood group antigens Clausen & Hakomori, 1989.
Although the ABO(H) determinants are defined by a single sugar linked to an H precursor its synthesis follows a relatively complex pathway involving transcription from genes of a variety of different enzymes that facilitate linkage of the glycans to carriers such as proteins or lipids, synthesise of various requisite precursors, and elongate, branch and terminal modifications the glycan.
Glycosylation of many glycoproteins and glycolipids have essential biological roles and it has been estimated that 1-2% of human genome codes for proteins involved in the glycosylation process Varki, 1993. However, the ABO(H) glycans appear to be relatively biologically inert, and although their absence does not result in a pathological condition, they may still have biological consequences at a population level and they still pose a significant factor in transfusion and transplantation medicine.
The ABO(H) system predominantly consists of a few strong and easily defined phenotypes but there is also a range of unusual phenotypes including inherited and acquired phenotype variants. This review will mainl y focus on natural and unnatural mechanisms resulting in the synthesis and presence of blood group A antigen on red cells, and it will not review underlying genetic mechanisms which are reviewed elsewhere Oriol et al., 1986 Hakomori, 1999Morgan & Watkins, 2000Koscielak, 2001Olsson & Chester, 1996Olsson & Chester, 2001Chester & Olsson, 2001Yip, 2002Yamamoto, 2004Yamamoto et al., 2012Calafell et al., 2008Storry & Olsson, 2009Daniels, 2002Schenkel-Brunner, 2000 nor its biological/clinical significance. The principles described for blood group A antigen are in most cases also applicable to blood group B and AB antigens.

Category

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