

Blood groups and cross-matching

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Human red cells have on their cell surface many different antigens. Two groups of antigens are of major importance in surgical practice – the ABO and rhesus systems. ABO system These proteins are strongly antigenic and are associated with naturally occurring antibodies in the serum. The system consists of three allelic genes – A, B and O – which control synthesis of enzymes that add carbohydrate residues to cell surface glycoproteins. A and B genes add specific residues while the O gene is an amorph and does not transform the glycoprotein. The system allows for six possible genotypes although there are only four phenotypes. Naturally occurring antibodies are found in the serum of those lacking the corresponding antigen (Table 2.7). Blood group O is the universal donor type as it contains no antigens to provoke a reaction. Conversely , group AB individuals are ‘universal recipients’ and can receive any ABO blood type because they have no circulating antibodies. Rhesus system The rhesus D (Rh(D)) antigen is strongly antigenic and is present in approximately 85% of the population in the UK. Antibodies to the D antigen are not naturally present in the serum of the remaining 15% of individuals, but their formation may be stimulated by the transfusion of Rh-positive red cells or they may be acquired during delivery of a Rh(D)-positive baby . Acquired antibodies are capable, during pregnancy , of crossing the placenta and, if present in a Rh(D)-negative mother, may cause severe haemolytic anaemia and even death (hydrops fetalis) in a Rh(D)-positive fetus in utero. The other minor blood group antigens may be associated with naturally occurring antibodies, or may stimulate the formation of antibodies on relatively rare occasions.

Phenotype	Genotype	Antigens
O	OO	O
A	AA or AO	A
B	BB or BO	B
AB	AB	AB

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