

Table S1. Rh antigens expressed by variants of both Rh proteins, RhD and RhCE

Antigen	Rh protein	Allele name	Molecular basis*	Comment
c (RH4)	RhCE	<i>RHce, RHcE</i>	103P (307C) is critical	requirements for antigen expression not fully understood
	RhD	unnamed <i>RHD</i> (S103P)	103P (307C)	c antigen not confirmed yet
		<i>DIIIb</i>	<i>RHD-CE(2)-D</i>	<i>cDe</i>
		<i>DIII type 7</i>	<i>RHD-CE(2)-D</i> and dispersed mutations	<i>cDe</i>
		<i>DVII type 2</i>	103P (307C), 110P (329C)	<i>C(c)De</i> , c antigen confirmed
	<i>RHCE(1-3)-D(4-10)</i>	<i>RHCE(1-3)-D(4-10)</i>	<i>cDE</i>	
G (RH12)	RhCE	<i>RHce, RHCE</i>	103S (307T) is standard for C and D	G negative, if 103P (307C)
	RhD	<i>RHD</i>	103S (307T) is standard for C and D	G negative, if 103P (307C)
c-like (RH26)	RhCE	<i>RHce</i>	96G (286G), on Rhce only	RH26 negative, if 96S
	RhD	unnamed <i>RHD</i> (S96G)	96G (286G)	c antigen not confirmed yet
Rh32 (RH32)	RhCE	<i>RHCE-D(4)-CE</i>	<i>RHCE-D(4)-CE</i>	with or without T152N (445C>A)
	RhD	<i>DBT-1</i>	<i>RHD-CE(5-7)-D</i>	hybrid in <i>RHD</i>
		<i>DBT-2</i>	<i>RHD-CE(5-9)-D</i>	hybrid in <i>RHD</i>
Evans (RH37)	RhCE	<i>Dav</i>	<i>RHD(1-6)-CE</i>	hybrid in <i>RHCE</i>
		<i>JD</i>	<i>RHD(1 to part of 6)-CE</i> or <i>RHCE(1)-D</i>	hybrid in <i>RHCE</i>
		<i>AT</i>	<i>RHCE-D(2-6)-CE</i>	hybrid in <i>RHCE</i>
	RhD	<i>DIVb</i>	<i>RHD-CE(part of 7 to 9)-D</i>	hybrid in <i>RHD</i>
FPTT (RH50)	RhCE	<i>DHAR</i>	<i>RHce-D(5)-ce</i>	also Rh33 positive
	RhD	<i>DFR</i>	<i>RHD-CE(4)-D</i>	hybrid in <i>RHD</i>

* The molecular basis is shown as amino acid substitution (nucleotide substitution) or as description of the hybrid.

Table S2. Pairs of *RHCE* and *RHD* alleles harboring identical single nucleotide substitutions that are known to encode low-prevalence Rh antigens

Nucleotide substitution	Amino acid substitution	<i>RHCE</i> alleles	<i>RHD</i> alleles
340C>T	R114W	<i>CeMA</i> ^{1,2} and <i>ce</i> ^s (340) ^{1,2*}	<i>Weak D type 17</i> ⁶
341G>A	R114Q	<i>RHce</i> (R114Q) ²	<i>Weak D type 25</i>
340C>G	R114G	not described	<i>Weak D type 47</i>
365C>T	S122L	<i>RHce</i> (S122L) ³ and <i>ceSL</i> ⁴	<i>Weak D type 54</i>

* Additional RhD-like amino acid substitution L245V

Table S3. Discussion of suggested molecular causes of various JAL antigen densities based on the current homology model¹

RhCE variant	Amino acid position			JAL expression	Comment
	16	114	245		
RhCe	Cys	Arg	Leu	no	Reference structure of Ce. The hydrophilic Arg114 is suggested to extend to the membrane surface (“snorkeling”) and to form potentially a hydrogen bond with the helix-capping and e-specific Ala226 residue. ¹
Rhce	Trp/Cys*	Arg	Leu	no	Reference structure of ce. The same comment for Arg114 as in RhCe. ¹
ce ^s	Cys/Trp†	Arg	Val‡	no	Leu245Val causes expression of V and VS antigens and contributes to weak e. ⁸
CeMA	Cys	Trp	Leu	strong ²	The hydrophobic Trp114 is more probable to remain within the phospholipid bilayer than the membrane surface. The large, bulky aromatic side chain is likely to be associated with structural displacement. ¹
Rhce(R114Q)	Trp	Gln	Leu	weak ²	The hydrophilic Gln114 may extend to the membrane surface (“snorkeling”) like the hydrophilic Arg114. However, the shorter side chain of Gln may prevent formation of the hydrogen bond with Ala226, which is possible with the larger side chain of Arg. Further, Gln may cause less structural displacement than the bulky Trp.
ce ^s (340)	Trp	Trp	Val‡	weak ²	Like in CeMA, the Trp114 may remain in the bilayer. In difference to CeMA, however, the JAL antigen is weak. ² This may be caused by the additional Leu245Val, which is known to weaken the e antigen in ce ^s . No or only weak expression of V and VS antigens.

* Trp16 in the RhCE protein is usually but not exclusively associated with the c antigen. However, two thirds of the *cDe* haplotypes expressing a normal c antigen have Cys16. However, e is altered in these persons.

† There are ce^s variants with Cys16 and Trp16. Cys16 is associated with altered e antigen in ce variants.

‡ Leu245Val is a RhD-like amino acid substitution