Globoside Blood Group Collection

Number of antigens 2

High prevalence LKE, PX2

Terminology

ISBT symbol (number)	GLOB (209)
Obsolete name	GLOBO
History	P, P^k, and LKE were removed from the P system (see **003**) because these antigens belong to the globoseries of glycolipids, while the P1 antigen is part of the neolactoseries. They were gathered into an unnamed Collection in 1990 because of their serological and biochemical relationship (all three antigens are based on lactosylceramide); in 1991, the name Globoside (GLOB) Collection was assigned. In 2002, P was upgraded to its own system (**GLOB 028**), and in 2010, P^k was moved to the P system, which was then renamed the P1PK system. In 2010, the remaining antigen in the GLOB Collection, LKE, was joined by PX2.

Carrier molecule

The sequential action of multiple gene products is required for expression of these antigens.
See P1PK (**003**) and GLOB (**028**) Blood Group Systems, and Section III.

Disease association

LKE and disialo-LKE are associated with metastasis in renal cell carcinoma.

The Blood Group Antigen (3/e). DOI: http://dx.doi.org/10.1016/B978-0-12-415849-8.00039-9

Null phenotypes

For the LKE antigen the null phenotypes are p, P_1^k, and P_2^k, and for the PX2 antigen the null phenotypes are P_1^k and P_2^k.

LKE Antigen

Terminology

ISBT symbol (number)	GLOB3 (209003 or 209.3)
Obsolete names	Luke; SSEA-4; MSGG (monosialo-galactosyl-globoside)
History	In 1986, the name LKE was proposed for the antigen detected by the Luke serum, which was reported in 1965. LKE joined the GLOB collection in 1990.

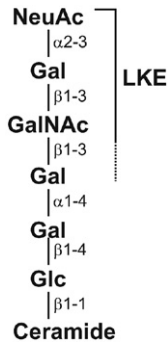
Occurrence

All populations	98%

Expression

Cord RBCs	Expressed

Molecular basis associated with LKE antigen[1]



Effect of enzymes and chemicals on LKE antigen on intact RBCs

Ficin/Papain	Resistant (markedly enhanced)
Trypsin	Resistant (markedly enhanced)
α-Chymotrypsin	Resistant
Sialidase	Sensitive
DTT 200 mM	Resistant
Acid	Resistant

In vitro characteristics of alloanti-LKE

Immunoglobulin class	IgM
Optimal technique	RT or lower
Complement binding	Some

Clinical significance of alloanti-LKE

Transfusion reaction	None reported
HDFN	No

Comments

Anti-LKE in humans is a rare specificity.
The expression of LKE and P^k antigens is inversely related: LKE-negative RBCs express almost twice the P^k expressed by LKE+ (strong) RBCs[2].
Terminal NeuNAc is crucial for the LKE determinant; standard methods for sialidase treatment of RBCs do not affect reaction of RBCs with monoclonal anti-LKE.
The presence of *Se* decreases LKE expression; secretors have a 3-4 fold decreased risk of *E. coli* infections.
There are three LKE phenotypes[3]:

$LKE+^S$	80% to 90%
$LKE+^W$	10% to 20% (correlated to alterations in *B3GALT5*[3])
LKE–	1% to 2%

References

[1] Bailly, P., Bouhours, J.F., 1995. P blood group and related antigens. In: Cartron, J.-P., Rouger, P. (Eds.), Molecular Basis of Human Blood Group Antigens. Plenum Press, New York, NY, pp. 300–329.
[2] Cooling, L.L., Kelly, K., 2001. Inverse expression of P^k and Luke blood group antigens on human RBCs. Transfusion 41, 898–907.
[3] Cooling, L., 2002. A missense mutation in β3GalT5, the glycosyltransferase responsible for galactosylgloboside and Lewis c synthesis, may be associated with the LKE-weak phenotype in African Americans [abstract]. Transfusion 42 (Suppl.): 9S.

PX2 Antigen

Terminology

ISBT symbol (number)	GLOB4 (209004 or 209.4)
History	In 2010, PX2 was added to the GLOB Collection after antibodies in plasma from P^k people were shown to agglutinate RBCs with the p phenotype ($PP1P^K–$).

Occurrence

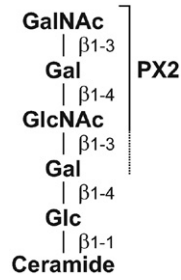
All populations	>99.9%

Expression

Cord RBCs	Expressed

Molecular basis associated with PX2 antigen[1,2,3]

A terminal β3-*N*-acetylgalactosamine (β3GalNAc) on paragloboside



Effect of enzymes and chemicals on PX2 antigen on intact RBCs

Ficin/Papain	Resistant (enhanced)

In vitro characteristics of alloanti-PX2

Immunoglobulin class	IgG (possibly mixture of IgM and IgG)
Optimal technique	IAT with papain-treated RBCs

Clinical significance of alloanti-PX2

No data available

Comments

Weak/variable reactivity in cross matching tests of plasma from P^k individuals with RBCs of the p phenotype detects the PX2 antigen.
Anti-PX2 appears to be naturally-occurring.
PX2 is expressed more strongly on RBCs with the p phenotype than on RBCs with other phenotypes[2,3].

References

[1] Kannagi, R., et al., 1982. A new glycolipid antigen isolated from human erythrocyte membranes reacting with antibodies directed to globo-N-tetraosylceramide (globoside). J Biol Chem 257, 4438–4442.

[2] Olsson, M.L., et al., 2011. PX2: a new blood group antigen with implications for transfusion recommendations in P1K and P2K individuals [abstract]. Vox Sang 101 (Suppl. 1), 53.
[3] Thorn, J.J., et al., 1992. Structural characterization of x2 glycosphingolipid, its extended form, and its sialosyl derivatives: accumulation associated with the rare blood group p phenotype. Biochemistry (Mosc) 31, 6509–6517.