

**International Blood Group  
Reference Laboratory**

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<b>Antigen</b>	Glycophorin C (extracellular domain) / CD 236R
<b>Clone</b>	BRIC 10
<b>Product Code</b>	9411
<b>Immunoglobulin Class</b>	Mouse IgG1, kappa light chain

**Protein Development  
and Production Unit**

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### Antigen Description and Distribution

Glycophorin C (GPC, sialoglycoprotein  $\beta$ , glycoconnectin) and glycophorin D (GPD, sialoglycoprotein  $\sigma$ ) are closely related erythrocyte transmembraneous glycoproteins, which are products of the same glycophorin C gene<sup>1</sup>. The GPC (Mr 40K) amino acid sequence consists of 128 amino acids which traverses the bilayer once. GPC has three domains: (i) a glycosylated N-terminal extracellular domain (residues 1-57) containing about 12 O-glycans and 1 N-glycan; (ii) a hydrophobic intramembranous domain (58-81) which spans the lipid bi-layer; and (iii) a C-terminal cytoplasmic domain (82-128). GPD is identical to GPC but lacks the first 21 NH<sub>2</sub>-terminal amino acid residues<sup>2,3</sup>. GPC is coded on chromosome 2q14-q21. The functional role of GPC and GPD is in the regulation of shape and membrane mechanical properties of the red cell through the interaction of their cytoplasmic domains with membrane protein 4.1 within the cytoskeleton network<sup>2</sup>. GPC carries the Gerbich blood group antigens<sup>2</sup>. GPC is deficient in erythrocytes of the Leach type of Gerbich negative. The other types of Gerbich negative, Gerbich type and Yus type, have altered forms of GPC. Rare individuals of the Leach phenotype lacking GPC and GPD have elliptocytic red cells<sup>2</sup>. GPC expression is not confined to erythroid cells<sup>3</sup> as GPC has a fairly broad distribution in both erythroid and non-erythroid tissues<sup>4,5</sup>. Previously 50-100,000 copies of GPC per red cell were estimated. By the use of Fab fragments of monoclonal antibodies, the number of molecules per red cell has been estimated at 143,000<sup>6</sup>.

### Clone

BRIC 10 was made in response to human erythrocytes<sup>7</sup>. It reacts by immunoblotting with a component of 30 - 35 kDa in reduced or non - reduced erythrocyte membranes. BRIC 10 is a direct haemagglutinin<sup>8</sup> which defines an epitope at the amino terminus of GPC<sup>9</sup>. BRIC 10 is reactive with HEL, K562 and U937 cell lines by flow cytometry. BRIC 10 has a binding affinity<sup>6</sup> to erythrocytes of  $4.9 \pm 1.8 \times 10^8 \text{ molL}^{-1}$ . BRIC 10 was submitted to second international workshop on monoclonal antibodies against human red blood cells, Lund 1990<sup>10</sup>. BRIC 10 has been used to investigate the key membrane protein changes during *in vitro* erythropoiesis of Protein 4.2 cells<sup>11</sup>.

### Serological Reactions with BRIC 10

CELLS	METHOD		
	Saline Immediate Spin		LISS IAGT
	Untreated	Trypsin Treated	
Normal	+++++	-	+++++
Ge: -2, 3, 4 (Yus type)	-	-	++++
Ge: -2, -3, 4 (Gerbich)	-	+++++	++++
Ge: -2, 3, -4 (Leach type)	-	-	-

### References

1. Cartron JP, Colin Y, Kudo S, Fukuda M. (1990) In Blood Cell Biochemistry Volume 1: Erythroid Cells. (ed. JR Harris) 299-335. Plenum Press.
2. Anstee DJ (1990) Vox Sang. **58** 1-20 (review).
3. Tanner MJA, High S, Martin PG, Anstee DJ, Judson PA and Jones TJ (1988) Biochem. J. **250**, 407-414.
4. Anstee DJ, Holmes CH, Judson PA, Tanner MJA (1992) In Protein blood group antigens on the human red cell, chapter 8 170-181. Agre P. & Cartron JP. (ed) Johns Hopkins University Press.
5. Le Van Kim C, Colin Y, Mitjavila M-T, *et al* (1989) J. Biol. Chem. **264** 20407-20414 Anstee D.J., *et al* (1984) Biochem. J. **218**: 615-619.
6. Smythe J *et al* (1994) Blood **83** 6 1668-1672.
7. Anstee DJ, Parsons SF, Ridgwell K *et al* (1984) Biochem J. **218** 615-619.
8. Anstee DJ, Ridgwell K *et al* (1984) Biochem J. **221** 97-104.
9. Dahr W, Blanchard D, Kiedrowski S *et al* (1989) Biol. Chem. Hoppe Seyler **370** 849-854.
10. Chester MA *et al* (ed) (1990) Proceedings of the second international workshop and symposium on monoclonal antibodies against human red blood cells and related antigens, Lund 1990.
11. Van den Akker E *et al* (2010). Investigating the key membrane protein changes during *in vitro* erythropoiesis of protein 4.2 (-) cells (mutations Chartres 1 and 2). Haematologica Aug; **95** (8):1278-86.