Bristol Institute for Transfusion Sciences
Incorporating the
International Blood Group Reference Laboratory

NHS Blood and Transplant

IBGRL RESEARCH PRODUCTS

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Antigen	CD233 / Band 3 (extracellular domain)
Clone	BRAC 17
Product Code	9451
Immunoglobulin Class	Rat IgG2b, kappa light chain

Antigen Description and Distribution

CD233 (also known as erythrocyte band 3, EPB3, anion exchange protein 1, AE1, solute carrier family 4, SLC4A1) is an integral membrane protein in human erythrocytes, present at approximately 10^6 copies per human erythrocyte. It comprises two domains that are structurally and functionally distinct. The cytoplasmic N-terminal 40kDa domain has binding sites for erythrocyte cytoskeletal proteins, namely ankyrin and protein 4.2, which help to maintain the mechanical properties and integrity of the erythrocyte. This domain also binds a number of other erythrocyte peripheral proteins. The 55kDa glycosylated C-terminal membrane-associated domain contains 12-14 membrane spanning segments which function as a chloride/bicarbonate anion exchanger involved in carbon dioxide transport. The cytoplasmic tail at the extreme C-terminus of the membrane domain binds carbonic anhydrase II. CD233 associates with the erythrocyte membrane protein glycophorin A (GPA) which promotes the correct folding and translocation during biosynthesis of CD233. Many CD233 mutations are known in man and these mutations can lead to two types of disease; destabilization of the erythrocyte membrane leading to hereditary spherocytosis, and defective kidney acid secretion leading to distal renal tubular acidosis. Other CD233 mutations that do not give rise to disease result in novel blood group antigens, which form the Diego blood group system. The CD233 gene is located on chromosome 17q21-q22[1].

Clone

BRAC 17 was made in response to intact human erythrocytes[2]. BRAC 17 binds to an exofacial epitope on CD233 and agglutinates normal erythrocytes indirectly. BRAC 17 fails to agglutinate pronase-treated normal erythrocytes but agglutinates cells that have been treated with trypsin, sialidase, or 6% aminoethylisothiouronium bromide. BRAC 17 does not give reduced titres with chymotrypsin treated cells. BRAC 17 failed to react with erythrocytes treated sequentially with chymotrypsin and LISS trypsin. Chymotrypsin treatment of intact erythrocytes cleaves the membrane domain of CD233 after Try-553[3] and try-558[4]. Pronase also cleaves in this region, whereas trypsin under LISS conditions cleaves after Lys-562[5]. The exact binding site of BRAC 17 is unknown but, because it fails to agglutinated pronase treated erythrocytes, it probably binds somewhere on the extracellular loop between amino acids 545 and 567[2]. BRAC 17 does not react with electrophoretically separated components of human erythrocyte membranes by immunoblotting. Immuneprecipitation from radioiodinated untreated and trypsin treated erythrocytes show a diffuse labelled band of Mr 95, 000. BRAC 17 reacts by immune fluorescence with normal peripheral blood granulocytes and the myeloid cell lines HL60 and U937.

References

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5. Brock C.J., Tanner M.J.A., Kempf C. Biochem J 213: 577 (1983).