International Society of Blood Transfusion
Société Internationale de Transfusion Sanguine
Section Editor: *B. Habibi*, Paris

Vox Sang 1993;65:77–80

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ISBT Working Party on Terminology for Red Cell Surface Antigens

São Paulo Report

The responsibility of the ISBT Working Party on Terminology for Red Cell Surface Antigens is to maintain and monitor a machine- and eye-readable terminology in keeping with the genetic basis of blood groups. The Working Party published a report in Vox Sanguinis in 1990 outlining the recommended terminology and providing other relevant information [1]. A supplement to this report was published in 1991 following the Los Angeles meeting of the Working Party [2]. On 11 October, 1992, the Working Party met in São Paulo, Brazil, during the 22nd ISBT Congress. In the light of new findings, a number of additions or changes to the 1990 classifications were made and are reported here. Tables 1–5 include most modifications agreed since 1990, so that the present report can be used in conjunction with the 1990 report alone. It is envisaged that a full revision of the ISBT terminology will be published following the Amsterdam meeting in 1994.

Table 1. Additions to existing blood group systems since 1990 [1]

002 MNS	004 RH	005 LU	014 DO
032 DANE	049 STEM	018 Au^a	003 Gy^a
033 TSEN		019 Au^b	004 Hy
034 MINY		020 Lu20	005 Jo^a
035 MUT			
036 SAT			
037 ERIK			

Existing Blood Group Systems (table 1)

002, The MNS System. Five new low incidence antigens have been added since the 1991 report [2]. MNS33 (TSEN) and MNS34 (MINY) represent abnormal amino acid sequences on glycophorin (GP) hybrid molecules, GP(A-B), resulting from a GPA^{58} to GPB^{27} junction; MNS33 is expressed only when the GPB portion of the molecule expresses S [3, 4]. MNS35 (MUT) represents an antigen defined by antibodies which generally behave as inseparable anti-MNS10 and anti-MNS19 (anti-Mur/Hut), although there are some exceptional phenotypes [5]. MNS36 (SAT) is associated with a unique GP(A-B) hybrid in one family and an abnormal M antigen in another [6]. MNS37 (ERIK) is located on a GPA molecule with a $Gly^{59} \rightarrow Arg$ substitution; exon skipping within the abnormal *GYPA* gene also results in a shortened GPA molecule expressing MNS15 (St^a) [7, 8].

004, The Rh System. RH49 (STEM) is a low incidence antigen which may be associated with the absence of RH19 (hr^S) or RH31 (hr^B). The assignment to Rh is supported by family evidence ($\hat{z}$ 5.21 at $\hat{\theta} = 0$) [9].

005, The Lutheran System. A high incidence antigen absent from LU:–1,–2 cells and located on the Lutheran glycoproteins is numbered LU20 [10].

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Table 2. New blood group systems since 1990 [1]

Name	Symbol	No.	No. within system									
			001	002	003	004	005	006	007	008	009	010
Gerbich	GE	020	...	Ge2	Ge3	Ge4	Wb	Ls^a	An^a	Dh^a		
Cromer	CROMER	021	Cr^a	Tc^a	Tc^b	Tc^c	Dr^a	Es^a	IFC	WES^a	WES^b	UMC
Knops	KN	022	Kn^a	Kn^b	McC^a	Sl^a	Yk^a					

Table 3. Chromosomal assignments of blood group system genes since 1990 [1]

Locus	Chromosome and region
CROMER (DAF)	1q32
KN (CR1)	1q32
GE (GYPC)	2q14→q21
CO	7p
KEL	7q33
YT (ACHE)	7q22

014, The Dombrock System. Serological and biochemical evidence [11] has led to the antigens of collection 206 (Gregory) and the high incidence antigen 901004 (Jo^a) being elevated to the Dombrock system. 206001 (Gy^a) has become DO3; 206002 (Hy) is DO4; 901004 (Jo^a) is DO5. Red cells lacking the DO3 antigen represent a null phenotype and are DO:–1,–2,–3,–4,–5. DO:–4 cells are DO:-1,2,3 with weak DO2 and DO3 antigens. DO1, DO3, DO4, and DO5 have all been shown to be on the same membrane glycoprotein. DO2 awaits appropriate testing [11, 12].

New Blood Group System (table 2)

022, The Knops System. The following antigens of collection 205 (Cost) are located on the C3b/C4b receptor, complement receptor 1 (CR1, CD35): 205004 (Kn^a); 205005 (Kn^b); 205006 (McC^a); 205007 (Sl^a); and 205003 (Yk^a) [13, 14]. The *CR1* locus belongs to the regulators of complement activation (RCA) gene cluster on chromosome 1q32, which also includes the *DAF* (Cromer system) locus. Consequently, like *DAF, CR1* is distinct from genes controlling systems 001 to 021 [2]. The Knops system is shown in table 2. The antigens 205001 (Cs^a) and 205002 (Cs^b) do not appear to be on CR1 and remain in the Cost collection (205) [14, 15].

Chromosome Location of Blood Group System Genes (table 3)

Close linkage of *YT* to two DNA polymorphisms has confirmed the assignment of *YT* to chromosome 7q [16]. Furthermore, Yt^a and Yt^b are carried on the acetylcholinesterase protein [17] and *YT* polymorphism is determined by the amino acid occupying position 322 [18]. The recent assignment of the acetylcholinesterase locus to 7q22 thus provides *YT* regional localization [19]. The *KEL* locus was assigned to 7q32–q36 through close linkage with the prolactin-inducible protein locus *(PIP)* [20] and confirmed by linkage with three DNA markers tightly linked to the cystic fibrosis locus [21]. In situ hybridization studies have refined the *KEL* location to 7q33 [22]. Location of system 22 (Knops) antigens on CR1 assigns the locus governing them to 1q32 [13, 14]. Association of DI1 with a band-3 variant suggests that the Diego system (010) may be controlled by the *EPB3* locus on chromosome 17q [23].

Blood Group Collections (table 4)

Collection 205 (Cost) now consists of 205001 (Cs^a) and 205002 (Cs^b) only; 205003 to 205007 comprise the new system 22 (Knops). Collection 206 (Gregory) is obsolete as both antigens previously within that collection are now part of system 14 (Dombrock).

The 700 Series (table 5)

There have been no changes in the 700 series since the 1991 report.

The 901 Series (table 5)

901004 (Jo^a) has become 014005 and the number 901004 is obsolete.

Table 4. Changes to blood group collections since 1990 [1]

Collection		Specificity		Comments
No.	name	No.	symbol	
201	Gerbich			Obsolete, now 020
202	Cromer			Obsolete, now 021
204	Auberger			Obsolete
		204001	Au^a	Now 005018
		204002	Au^b	Now 005019
205	Cost	205003	Yk^a	Obsolete, now 022005
		205004	Kn^a	Obsolete, now 022001
		205005	Kn^b	Obsolete, now 022002
		205006	McC^a	Obsolete, now 022003
		205007	Sl^a	Obsolete, now 022004
206	Gregory			Obsolete
		206001	Gy^a	Now 014003
		206002	Hy	Now 014004
210		210001	Le^c	
		210002	Le^d	
211	Wright	211001	Wr^a	
		211002	Wr^b	

Table 5. Changes to 700 and 901 series since 1990 [1]

No.	Name	Symbol	Comments
700001	Wright	Wr^a	Obsolete, now 211001
700012	Griffiths	Gf	Obsolete
700020	Ahonen	An^a	Obsolete, now 020007
700031	Duch	Dh^a	Obsolete, now 020008
700032	POLLIO	POLL	Obsolete
700048	FPTT	FPTT	
700049	HJK	HJK	
700050	HOFM	HOFM	
700051	ELO	ELO	
901004	Joseph	Jo^a	Obsolete, now 014005
901010	Fritz	Wr^b	Obsolete, now 211002

Applications for ISBT Numbers

The 1990 report [1] should be consulted for the criteria and procedures required for acquisition of ISBT numbers. The necessary forms will be found in appendices 2, 3, and 4 [1]. MNS32 to MNS37 and 700048 to 700051 must be added to appendix 2 in which 700.12 and 32 should be deleted. LU20 must be added to appendix 3. Other changes in numerical designations resulting from this report and the 1991 report [2] should be made, or revised application forms should be requested from the appropriate Working Party member:

Prof. Dr. W. Dahr for an MNS number
Dr. P. D. Issitt for an Rh number
Dr. J. Jørgensen for a number in other systems
Dr. D. J. Anstee for a number in collections
Dr. A. Lubenko for a 700 number
Dr. G. L. Daniels for a 901 number

For addresses and Fax numbers see appendix 5 [1]. The following address and Fax numbers have been changed:

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All other correspondence relevant to the activities of the Working Party should be directed to:

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