

Names for XG (ISBT 012) Blood Group Alleles

Intro

General description: The XG blood group system consists of 2 antigens carried on 2 single-pass glycoproteins, encoded by the genes *XG* and *CD99*, located in pseudoautosomal region 1 (PAR1) of the sex chromosomes. The Xg glycoprotein is encoded by the X chromosome only, while the CD99 glycoprotein is encoded by both X and Y chromosomes. On Y, only exons 1-3 of *XG* exist. Both genes encode single pass glycoproteins of 180 and 185 amino acids, respectively.

Gene name: *XG*

Number of exons: 10

Initiation codon: Within exon 1

Stop codon: Within exon 10

Entrez Gene ID: 7499

LRG: LRG_805

LRG sequence: NG_011627.1 (genomic)
NM_175569.2 (transcript)

Reference allele: *XG*01* (shaded)

Reference allele *Xg*^a
*XG*01* encodes:

Antithetical antigens: n.a.

Additional information

Gene name: *CD99*

Number of exons: 10
Initiation codon: Within exon 1
Stop codon: Within exon 10

Entrez Gene ID: 4267

LRG: LRG_1023
LRG sequence: NG_009174.1 (genomic)
NM_002414.3 (transcript)

Reference allele: *CD99*01* (shaded)

Reference allele *CD99*
*CD99*01* encodes:

Antithetical antigens: n.a.

Additional information

Phenotype	Allele name	Nucleotide change	Exon Intron	Predicted amino acid change	(Reference No.) PMID	Accession number	rs number
Xg ^a	<i>XG*01</i>						
Null phenotypes							
Xg(a-)	<i>XG*01N.01</i>	NC_000023.11: g.2748343G>C	5' UTR	p.0	PMID: 29748255 PMID: 30061310	n.a.	rs311103
Xg(a-)	<i>XG*01N.02</i>	NC_000023.11: 2,776,388_2,890783del	i3	p.0	PMID: 30938838	n.a.	esv2662319
Xg(a-)	<i>XG*01N.03</i>	NC_000023.11: 2,776,662_2,891,056del	i3	p.0		n.a.	n.a.
CD99	<i>CD99*01</i>						
Null phenotypes							
CD99-	<i>CD99*01N.01</i>	c.(100 + 1_101-1)_(361 + 1_362-1)del	3-7	p.0	(1), Abstract	n.a.	n.a.
CD99-	<i>CD99*01N.02</i>	c.(148 + 1_149-1)_(475 + 1_476-1)del	4-8	p.0	(1) Abstract	n.a.	n.a.
CD99-	<i>CD99*01N.03</i>	c.(67 + 1_68-1)_(475 + 1_476-1)del	2-8	p.0	(1) Abstract	n.a.	n.a.

References

- PMID 29748255 Möller M, Lee YQ, Vidovic K, Kjellström S, Björkman L, Storry JR, Olsson ML. Disruption of a GATA1-binding motif upstream of XG/PBDX abolishes Xga expression and resolves the Xg blood group system. *Blood*. 2018 Jul 19;132(3):334-338.
- PMID 30061310 Yeh CC, Chang CJ, Twu YC, Chu CC, Liu BS, Huang JT, Hung ST, Chan YS, Tsai YJ, Lin SW, Lin M, Yu LC. The molecular genetic background leading to the formation of the human erythroid-specific Xg^a/CD99 blood groups. *Blood Adv*. 2018 Aug 14;2(15):1854-1864. doi: 10.1182/bloodadvances.2018018879. PMID: 30061310; PMCID: PMC6093725.
- PMID 30938838 Lee YQ, Storry JR, Karamatic Crew V, Halverson GR, Thornton N, Olsson ML. A large deletion spanning XG and GYG2 constitutes a genetic basis of the Xgnull phenotype, underlying anti-Xg^a production. *Transfusion*. 2019 May;59(5):1843-1849.
- Abstract (1) Thornton NM, Karamatic Crew V, Muniz-Diaz E, Garcia- Arroba J, Nogues N, Lee E, Jones C, Schistal E, Jungbauer C, Allhoff W, Bullock T, Marais I, Daniels G. Four examples of anti-CD99 and discovery of the molecular bases of the rare CD99-phenotype. *Vox Sang* 2015;109(Suppl 1):50-1.
- PMID 36102098 Watanabe-Okochi N, Uchikawa M, Tsuneyama H, Ogasawara K, Shiraishi R, Masuno A, Onodera T, Tsuno NH, Muroi K. Genetic background of anti-Xga producers in Japanese blood donors. *Vox Sang*. 2022 Sep 14. doi: 10.1111/vox.13342. Online ahead of print.

Track of changes

			from	to
	Version		v3.0 30-OCT-2020	v3.1 30-SEP-2022
1	Author	created	Jill Storry	Jill Storry
2	Reviewer	reviewed		C. Gassner
3	Versioning	LRG ID corrected		LRG_802 corrected to LRG_805
4	Allele Table	corrected		<i>XG*01N.02</i> nucleotide positions corrected
5	New alleles	created		<i>XG*01N.03</i>
6	References	renumbered		renumbered Abstract (4) to (1)
7	References	added		added PMID 36102098
8	End of changes		v3.0 30-OCT-2020	v3.1 30-SEP-2022

Track of changes

	Version		from v2.0 160630	to v3.0 30-OCT-2020
1	Author	created	Geoff Daniels	Jill Storry
2	Reviewer	reviewed		
3	General			
4	Intro	Text changed		Changed and expanded: The XG blood group system consists of 2 antigens carried on 2 single-pass glycoproteins, encoded by the genes XG and CD99, located in pseudoautosomal region 1 (PAR1) of the sex chromosomes. The Xg glycoprotein is encoded by the X chromosome only, while the CD99 glycoprotein is encoded by both X and Y chromosomes. On Y, only exons 1-3 of XG exist. Both genes encode single pass glycoproteins of 180 and 185 amino acids, respectively.
5	Intro	LRG ID line added		LRG_802
6	Allele Table			Inserted
7	New alleles			Inserted
8	References			References found for all alleles and collated
9	End of changes		v2.0 160630	v3.0 30-OCT-2020