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The Mouse (*Mus musculus*) Immunoglobulin Kappa Variable (IGKV) Genes and Joining (IGKJ) Segments

Key Words

Mouse
IMGT
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Abstract

The 'Mouse (*Mus musculus*) Immunoglobulin Kappa Variable (IGKV) Genes and Joining (IGKJ) Segments', third report of the 'IMGT Locus on Focus' section, comprises four tables entitled: (1) 'Mouse (*Mus musculus*) germline IGKV gene table'; (2) 'Correspondence between Mouse (*Mus musculus*) IMGT IGKV subgroups and previous designations'; (3) 'Mouse (*Mus musculus*) germline IGKJ table', and (4) 'Mouse (*Mus musculus*) IGKJ allele table'. These tables are available at the IMGT Marie-Paule page from **IMGT**, the international ImMunoGeneTics database (<http://imgt.cnusc.fr:8104>) created by Marie-Paule Lefranc, CNRS, Université Montpellier II, Montpellier, France.

Introduction

'The Mouse (*Mus musculus*) Immunoglobulin Kappa Variable (IGKV) Genes and Joining (IGKJ) Segments' is the third report of the 'IMGT Locus on Focus' section launched in the April 1998 issue of *Experimental and Clinical Immunogenetics* [1], with the first report on the human IGLV genes and IGLJ segments [2] and the second report on human IGKV genes and IGKJ segments [3]. This third report comprises four tables entitled: (1) 'Mouse (*Mus musculus*) germline IGKV gene table'; (2) 'Correspondence between Mouse (*Mus musculus*) IMGT IGKV subgroups and previous designations'; (3) 'Mouse

(*Mus musculus*) germline IGKJ table', and (4) 'Mouse (*Mus musculus*) IGKJ allele table'. These tables are available at the IMGT Marie-Paule page from **IMGT**, the international ImMunoGeneTics database (<http://imgt.cnusc.fr:8104>) created by Marie-Paule Lefranc, CNRS, Université Montpellier II, France [4, 5]. Description of functionality (FUNCTIONAL, ORF, PSEUDOGENE) and description of mutations [1] are according to the IMGT scientific chart available at the IMGT Marie-Paule page. Nucleotide and amino acid numbering of the FR-IMGT and CDR-IMGT (table 1, notes) is according to the IMGT unique numbering [1, 6].

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Table 1

Mouse (*Mus musculus*) germline IGKV gene table

Fct : FUNCTIONALITY
 F : Functional
 P : Pseudogene
 ORF : Open Reading Frame
 R : Rearranged
 T : Transcribed
 Pr : Translated into protein

Functionality is shown between:

- **brackets** when the accession number refers to DNA genomic sequence, but not known as being germline or rearranged
 - **parentheses** when the accession number refers to a rearranged sequence and the corresponding germline gene has not yet been isolated.
- Mouse (*Mus musculus*) IGKV genes, which have not yet been mapped, are designated by a number for the subgroup, followed by the letter S and a number. The IGKV1/OR-1 and IGKV1/OR-2 orphon genes have been proposed to be localised on chromosomes 16 and 19, respectively [Schupp, I. et al, Immunogenetics 45,180-187 (1997)][27].

IGKV subgroup	IGKV gene name	Fct	R	T	Pr	Reference sequences	Accession numbers	Sequences from the literature
1	IGKV1S1	F	+	+	+	K5.1	D00080/M15566[6]	V-1A[M28131][22]
	IGKV1S2	F	+	+	+	K1A5	D00081[6]	V-1C[M28133][22]
	IGKV1S3	F	+	+	+	K18.1	D00082[6]	
	IGKV1S4	F	+	+	+	V-IB	M28132[22]	
	IGKV1S5	F	+	+		V-1Ct	M28134[22]	
	IGKV1S6	F	+	+		70/3	Z72384[27]	
	IGKV1S7	F	+	+		70/1	Z72382[27]	
	IGKV1/OR-1	P(1)				70/2	Z72383[27]	
	IGKV1/OR-2	P(2)				68	Z72381[27]	
	IGKV2S1	F	+	+		167	J00562[29]	24[K02415][15]
	IGKV2S2	F	+	+		24A	K02417[15]	
	IGKV2S3	F	+	+		24B	K02418[15]	
	IGKV2S4	F				CaV24	M80407[13]	
IGKV2S5	P(3)				CaV24A	M80408[13]		
IGKV2S6	F				CaV24B-1	M80409[13]		



7	IGKV6S8	F	+			19-20	Y15981[18]
	IGKV7S1	F					AF044198[32]
	IGKV7S2	P(13)				8-22	Y15983[18]
8	IGKV8S1	F(14)	+	+		GLVK50	L17135[10]
	IGKV8S2	F	+	+		8-16	Y15977[18]
	IGKV8S3	RF(15)				8-18	Y15979[18]
	IGKV8S4	F	+	+		8-19	Y15980[18]
	IGKV8S5	F	+	+		8-21	Y15982[18]
9	IGKV9S1	F	+			Vk41	V00804/J00566[28]
	IGKV9S2	RF(16)				M173b	K00880[21]
	IGKV9S3	F(17)				Vk9a	AF003294[30]
	IGKV9S4	F(17)				Vk9b	AF003295[30]
10	IGKV10S1	F	+	+		91A3	M15520[26]
	IGKV10S2	F				AKR1	M54903[17]
	IGKV10S3	F	+			AKR2	M54904[17]
	IGKV10S4	F	+	+		AJ2	M54906[17]
	IGKV10S5	F	+			PERU1	M54907[17]
	IGKV10S6	F				PERU2	M54908[17]
	IGKV10S7	F				Vk10c	AF029261[9]
	IGKV11S1	RF(19)				V11	M10116[16]#
	IGKV12S1	F	+	+		k2	J00545[23]
	IGKV12S2	F(20)				k3	J00546[28]
13	IGKV13S1	F](21)				Vk34B	M35154[31]p
	IGKV13S2	F](21)				Vk34A	M35155[31]p
	IGKV13S3	F](21)				Vk34C	M35156[31]p
	IGKV14S1	F	+	+		L6	V01563[24]
14	IGKV14S2	F(22)					M24179[3]
	IGKV14S3	P(23)				9B.8	X58992[20]
	IGKV14S4	P(24)				294A9	Z72385[27]
	IGKV15S1	P](25)				Vk32	M33992[7]#
15	IGKV15S2	(F)				Vk32Liv	U27011[2]#
	IGKV16S1	(F)	+	+		87.92.6	M13833[5]#
16	IGKV17S1	P(26)			294A9	Z72386[27]	
17							

Rearranged cDNA or genomic sequences.

p DNA genomic sequence, but not known as being germline or rearranged.

IMGT notes

- (1) DELETION of 16 bp at position 59/60 including the INIT-CODON in the L-PART1, DELETION of 2 bp at position 518/519 in the FR1-IMGT and DELETION of 1 bp at position 743/744 in the FR3-IMGT leading to frameshifts in the V-REGION.
- (2) INSERTION of 1 bp (position 645) in CDR1-IMGT and DELETION of 1 bp at position 796/797 in FR3-IMGT leading to frameshifts.
- (3) DELETION of 5 bp at position 21/22 in the FR1-IMGT leading to a frameshift and mutations in the V-REGION.
- (4) INSERTION of 1 bp (position 879) in FR3-IMGT leading to a frameshift.
- (5) INSERTION of 1 bp (position 828) in FR3-IMGT leading to a frameshift.
- (6) STOP-CODONS in FR2-IMGT and INSERTION of 1 bp (position 780) in FR3-IMGT.
- (7) INSERTION of 570 bp (positions 706-1271) in CDR3-IMGT.
- (8) STOP-CODON (positions 332-334) in FR1-IMGT.
- (9) INSERTION of 570 bp (position 713-1278) in CDR3-IMGT.
- (10) Partial V-GENE in 5' side: partial L-PART1.
- (11) Partial V-GENE in 5' side: no L-PART1, partial L-PART2 and no V-NONAMER.
- (12) Partial V-GENE in 5' side: no L-PART1, L-PART2, and no V-HEPTAMER, V-NONAMER.
- (13) STOP-CODON in FR2-IMGT, INSERTIONS in FR3-IMGT and DELETION in CDR3-IMGT leading to frameshifts.
- (14) Partial V-GENE : no L-PART1 and L-PART2, and partial CDR3-IMGT.
- (15) Non canonical V-HEPTAMER: CACAGAG instead of CACAGTG.
- (16) CONSERVED-Trip is replaced by a Leu in FR2-IMGT.
- (17) Partial V-GENE : no V-HEPTAMER and V-NONAMER.
- (18) Partial V-GENE in 5' side: no L-PART1 and partial L-PART2.
- (19) Defective DONOR_SPLICE: NGC instead of NGT.
- (20) Partial V-GENE in 3' side: no V-NONAMER.
- (21) Partial V-GENE in 5' and 3' side: partial L-PART1 and partial FR3-IMGT.
- (22) Partial V-REGION: partial FR3-IMGT and no CDR3-IMGT.
- (23) INSERTION of 2 bp (positions 344-345) leading to a frameshift in FR3-IMGT and defective ACCEPTOR-SPLICE: NTANNI instead of NAGNN.
- (24) DELETION of the ACCEPTOR-SPLICE, DELETION of 12 bp in the FR1-IMGT, DELETION of 1 bp and INSERTION of 1 bp in the CDR3-IMGT.
- (25) INSERTION of 4 bp (positions 181-184) leading to a frameshift in FR2-IMGT.
- (26) DELETION of 1 bp at position 601/602 in the FR1-IMGT and DELETION of 3 bp at position 604/605 in the CDR1-IMGT leading to frameshifts.

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Table 2

Correspondence between Mouse (*Mus musculus*) IMGT IGKV subgroups and previous designations

Mouse IMGT IGKV subgroups	Mouse previous IGKV subgroup designations [1]	Related human IMGT IGKV subgroups
IGKV1	VK1 and VK2	IGKV2
IGKV2	VK24/25	IGKV2
IGKV3	VK21	IGKV7
IGKV4	VK4/5	IGKV1, IGKV2, IGKV3
IGKV5	VK23	IGKV6
IGKV6	VK19/28	IGKV4
IGKV7	VK22	IGKV4
IGKV8	VK8	IGKV4
IGKV9	VK9A	IGKV1
IGKV10	VK10	IGKV1
IGKV11	VK11	IGKV1
IGKV12	VK12/13	IGKV1
IGKV13	VK33/34	IGKV1
IGKV14	VK9B	IGKV1
IGKV15	VK32	IGKV1
IGKV16	VKRF	IGKV1
IGKV17	VK20	IGKV5

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Table 3

Mouse (*Mus musculus*) germline IGKJ table

Fct: FUNCTIONALITY
 F : Functional
 ORF : Open Reading Frame

IGKJ name	Fct	Reference sequences	Accession numbers	Sequences from the literature
IGKJ1	F	J1	V00777[3]	JK1[M15521][5], J5[V00805][6][3], [M27036 (M27037,M27038)][4], J1[X68864][1][4], [X68866 (X68867)][1][5]
	F	J1	M15559[2][2]	
IGKJ2	F	J2	V00777[3]	M27037[4], JK2[M27038][4], J2[X68859][1][4]
	F	J2	M15559[3]	
IGKJ3	F	J2	M27036[4]	
	ORF(1)	J3	V00777[3]	M15559[2], [M27036 (M27038)][4]
IGKJ4	ORF(1)	J3	M27037[4]	
	F	J4	V00777[3]	[M27037 (M27038)][4], J4[X68854 (X68861)][1][4]
IGKJ5	F	J4	M15559[2]	M27036[4]
	F	J5	V00777[3]	M15559[2][M27036],[M27037],[M27038][4]

Notes

- (1) Non canonical DONOR_SPLICE: not instead of ngf.
- (2) Partial J-REGION: one nucleotide missing in 5'.
- (3) Partial J-SEGMENT: no JNONAMER.
- (4) Partial J-REGION: 4 amino acids missing in 3'.
- (5) Partial J-REGION: 3 amino acids missing in 3'.

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Table 4

Mouse (*Mus musculus*) IGKJ allele table

Fct: FUNCTIONALITY

F : Functional

ORF : Open Reading Frame

The accession number of a reference sequence is given for each allele.

IMGT numbering and description of alleles for germline J-REGIONS start with the first nucleotide of the first codon.

Mutations affecting the same codon are separated by a vertical line.

IGKJ name	Fct	IGKJ allele name	Accession numbers	Confirmed by genetics and/or data	Description of mutations
IGKJ1	F	IGKJ1*01	V00777	+	t2 ,w1 g3 ,w1 a37 ,k12
	F	IGKJ1*02	M15559		t2>c,w1>P g3>c,w1>P a37>t,k12>N
IGKJ2	F	IGKJ2*01	V00777	+	c5 g15 ,g5 g16 ,g5 a35 ,I11
	F	IGKJ2*02	M15559		c5>t g15>t,g5>S g16>c,g5>S a35>g,I11>M
	F	IGKJ2*03	M27036		c5>t g15>t,g5>S g16>c,g5>S
IGKJ3	OFF	IGKJ3*01	V00777	+	t3 ,I1
	OFF	IGKJ3*02	M27037		t3>c,I1>T
IGKJ4	F	IGKJ4*01	V00777	+	t14 ,s5 g25
	F	IGKJ4*02	M15559	+	t14>a,s5>T g25>a
IGKJ5	F	IGKJ5*01	V00777	+	

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