

## The Human T Cell Receptor Alpha Joining (TRAJ) Genes

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### Key Words

Human genes · IMGT · T cell receptor · Alpha joining genes

### Abstract

'Human T cell Receptor Alpha Joining Genes', the 9th report of the 'IMGT Locus in Focus' section, comprises 3 tables: (1) 'Human germline TRAJ genes'; (2) 'Human TRAJ allele table'; and (3) 'Nucleotide and protein displays of the human TRAJ alleles (overview)'. These tables are available on the IMGT Marie-Paule page from IMGT, the international ImMunoGeneTics database (<http://imgt.cines.fr:8104>) created in 1989 by Marie-Paule Lefranc, Université Montpellier II, CNRS, France.

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### Introduction

'Human T cell Receptor Alpha Joining Genes' is the 9th report of the 'IMGT Locus in Focus' section launched in the April 1998 issue of *Experimental and Clinical Immunogenetics* [1]. We have previously reported the complete repertoire of the human germline IGH, IGK and IGL genes [2–6], and that of the germline human TRBV [7] and TRAV [8] genes. This 9th report on the human T cell receptor alpha joining genes comprises 3 tables: (1) 'Human germline TRAJ genes'; (2) 'Human TRAJ allele table'; (3) 'Nucleotide and protein displays of the human TRAJ alleles (overview)'. These tables are available on the IMGT Marie-Paule page from IMGT, the international ImMunoGeneTics database (<http://imgt.cines.fr:8104>) created in 1989 by Marie-Paule Lefranc, Université Montpellier II, CNRS, France [9, 10]. Descriptions of functionality (functional, open reading frame, pseudogene) and of mutations are according to the IMGT Scientific chart [9, 10], available on the IMGT Marie-Paule page.

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**Table 1. Human germline TRAJ genes****Fct: FUNCTIONALITY****F:** Functional**P:** Pseudogene**ORF:** Open Reading Frame**vg:** Vestigial**R:** Rearranged**T:** Transcribed**Pr:** Translated into protein

"+" or "-" indicates if the gene sequences have been found (+) or not been found (-) rearranged (R), transcribed (T), and/or translated into protein (Pr).

Arbitrarily that information is shown on the first line of each gene when the data have been confirmed by several studies.

Note that AE000661 encompasses M94081 from TRAJ1 to TRAJ46, and AE000662 encompasses M94081 from TRAJ45 to TRAJ1.

Sequencing and/or typing errors initially detected by IMGT in M94081 sequence (TRAJ15, TRAJ36, TRAJ37) have been corrected with the author's authorization (B.K.) in EMBL (11/97). These errors have not yet been corrected in AE000662 sequence.

TRAJ name	Fct	R*	T*	P*	Reference sequences	Accession numbers	Position in M94081 (a)	Position in M94081 (b)	Sequences from the literature
<b>TRAJ1</b>	ORF(1)	-	-		X02884 [1]	84789-86510	85235-85296	J1[M94081][7], [AE000662][8]	
<b>TRAJ2</b>	ORF(2)				X02884 [1]	83858-84788	84269-84334	JaSP[X05003][2], JaSP[M14862][2], J2[M94081][7], [AE000662][8]	
<b>TRAJ3</b>	F	+	+		X02884 [1]	82422-83857	83376-83337	JaSP[X05003][2], JaSP[M14862][2], J3[M94081][7], [AE000662][8]	
<b>TRAJ4</b>	F	+	+		J4	M94081 [7]	80952-82421	82396-82458	[AE000662][8]
<b>TRAJ5</b>	F	+	+		J5	M94081 [7]	79892-80951	80444-80503	[AE000662][8]
<b>TRAJ6</b>	F	+	+		JA5	M16747 [4]	78579-79891	79270-79331	J6[M94081][7], [AE000662][8]
<b>TRAJ7</b>	F	+	+		J7	M94081 [7]	77118-78578	77821-77879	[AE000662][8]
<b>TRAJ8</b>	F	+	+		J8	M94081 [7]	76086-77117	76346-76405	[AE000662][8]
<b>TRAJ9</b>	F	+	+		J9	M94081 [7]	74764-76085	75756-75816	[AE000662][8]
<b>TRAJ10</b>	F	+	+		J10	M94081 [7]	73237-74763	73699-73762	[AE000662][8]
<b>TRAJ11</b>	F	+	+		J11	M94081 [7]	72459-73236	72706-72765	[AE000662][8]
<b>TRAJ12</b>	F	+	+		X02885 [1]	71747-72458	72143-72202	J12[M94081][7], [AE000662][8]	
<b>TRAJ13</b>	F	+	+		J13	M94081 [7]	70936-71746	71280-71342	[AE000662][8]
<b>TRAJ14</b>	F				J14	M94081 [7]	70218-70935	70532-70583	[AE000662][8]
<b>TRAJ15</b>	F	+	+		JaS	X05775 [5]			
	F	+	+		J15	M94081 [7]	69322-70217	69836-69895	[AE000662][8]
<b>TRAJ16</b>	F(3)	+	+		J16	M94081 [7]	67939-69321	68743-68802	[AE000662][8]
<b>TRAJ17</b>	F	+	+		JaLv	X05773 [5]	66507-67938	67068-67130	J17[M94081][7], [AE000662][8]
<b>TRAJ18</b>	F	+	+		J18	M94081 [7]	65715-66506	65876-65941	[AE000662][8]
<b>TRAJ19</b>	ORF(4)				J19	M94081 [7]	65051-65714	65489-65548	[AE000662][8]
<b>TRAJ20</b>	F	+	+	-	J20	M94081 [7]	64222-65050	64552-64608	[AE000662][8]
<b>TRAJ21</b>	F	+	+		J21	M94081 [7]	63083-64221	63829-63883	[AE000662][8]
<b>TRAJ22</b>	F	+	+		J22	X02886 [1]	61495-63082	62272-62334	J22[M94081][7], [AE000662][8]
<b>TRAJ23</b>	F	+	+		J23	M94081 [7]	60460-61494	60650-60712	[AE000662][8]
<b>TRAJ24</b>	F				X02887 [1]				
	F				M94081 [7]	59657-60459	60203-60265	[AE000662][8]	
<b>TRAJ25</b>	ORF(5)				X02888 [1]	58895-59656	59046-59105	J25[M94081][7], [AE000662][8]	
<b>TRAJ26</b>	F	+	+		J26	M94081 [7]	57625-58894	58680-58739	[AE000662][8]
<b>TRAJ27</b>	F	+	+	-	J27	M94081 [7]	56217-57624	56507-56565	[AE000662][8]
<b>TRAJ28</b>	F	+	+	-	J28	M94081 [7]	55049-56216	55857-55922	[AE000662][8]
<b>TRAJ29</b>	F	+	+		X02889 [1]	53664-55048	54177-54236	J29[M94081][7], [AE000662][8]	
<b>TRAJ30</b>	F	+	+		J30	M94081 [7]	52179-53663	53090-53146	[AE000662][8]
<b>TRAJ31</b>	F	+	+		M14905 [3]	50429-52178	53090-53146	J31[M94081][7], [AE000662][8]	
<b>TRAJ32</b>	F	+	+		J32	M94081 [7]	49243-50248	49581-49646	[AE000662][8]
<b>TRAJ33</b>	F	+	+		J33	M94081 [7]	48406-49242	48843-48899	[AE000662][8]
<b>TRAJ34</b>	F	+	+		JaAB	M35622 [6]	47428-48405	47907-47964	J34[M94081][7], [AE000662][8]
<b>TRAJ35</b>	ORF(6)	-	+	-	J35	M94081 [7]	46151-47427	46885-46943	[AE000662][8]
<b>TRAJ36</b>	F	+	+		J36	M94081 [7]	44705-46150	45353-45411	[AE000662][8]
<b>TRAJ37</b>	F	+	+		J37	M94081 [7]	43204-44704	43993-44054	[AE000662][8]

**Table 1** (continued)

TRAJ name	Fct	R*	T*	P*	Reference sequences	Accession numbers	Position in M94081 (a)	Position in M94081 (b)	Sequences from the literature
TRAJ38	F	+	+		J38	M94081 [7]	42130-43203	42473-42534	[AE000662][8]
TRAJ39	F	+	+		J39	M94081 [7]	40917-42129	41843-41905	[AE000662][8]
TRAJ40	F	+	+		JaAA	M35620 [6]	38946-40916	39930-39990	J40[M94081][7], [AE000662][8]
TRAJ41	F	+	+		J41	M94081 [7]	37548-38945	37900-37961	[AE000662][8]
TRAJ42	F	+	+		J42	M94081 [7]	36669-37547	37130-37195	[AE000662][8]
TRAJ43	F	+			J43	M94081 [7]	35641-36668	36154-36207	[AE000662][8]
TRAJ44	F	+	+		JaRP	M35619 [6]	34650-35640	35064-35126	J44[M94081][7], [AE000662][8]
TRAJ45	F	+	+		J45	M94081 [7]	33940-34649	34169-34234	[AE000662][8]
TRAJ46	F				J46	M94081 [7]	33400-33939	33647-33709	[AE000661][8]
TRAJ47	F	+	+		J47	M94081 [7]	31948-33399	33096-33152	[AE000661][8]
TRAJ48	F	+	+		J48	M94081 [7]	30264-31947	30737-30799	[AE000661][8]
TRAJ49	F	+	+		J49	M94081 [7]	29317-30263	29734-29789	[AE000661][8]
TRAJ50	F	+			J50	M94081 [7]	28166-29316	28839-28898	[AE000661][8]
TRAJ51	P(7)	-	-		J51	M94081 [7]	27017-28165	27429-27491	[AE000661][8]
TRAJ52	F	+	+		J52	M94081 [7]	24846-27016	26474-26542	[AE000661][8]
TRAJ53	F	+	+		J53	M94081 [7]	22923-24845	23251-23316	[AE000661][8]
TRAJ54	F	+	+	-	J54	M94081 [7]	22328-22922	22534-22593	[AE000661][8]
TRAJ55	P(7)				J55	M94081 [7]	19887-22327	21944-22000	[AE000661][8]
TRAJ56	F	+	+		J56	M94081 [7]	19475-19886	19768-19829	[AE000661][8]
TRAJ57	F	+	+		J57	M94081 [7]	18568-19474	19119-19181	[AE000661][8]
TRAJ58	ORF(8)	+	+		J58	M94081 [7]	17405-18467	17954-18016	[AE000661][8]
TRAJ59	ORF(9)	+	-	-	J59	M94081 [7]	16704-17404	16801-16854	[AE000661][8]
TRAJ60	P(7)	+			J60	M94081 [7]	16089-16703	16554-16610	[AE000661][8]
TRAJ61	ORF(9)	+			J61	M94081 [7]	12582-16088	15564-15623	[AE000661][8]

(a) Arbitrary limits of the DNA sequence assigned to the different TRA J-SEGMENTS, in M94081.

(b) Limits of the J-REGION.

**IMGT notes:**

- (1) Non canonical J-HEPTAMER: GGGCATG instead of CACTGTG, and non canonical J-NONAMER: ATTCTGT instead of GGTTTTGT.
- (2) Non canonical J-HEPTAMER: TACGGTA instead of CACTGTG.
- (3) Note in the J-REGION: Phe-Ala-X-Gly instead of Phe-Gly-X-Gly.
- (4) 7 nucleotides instead of 12 in J-SPACER.
- (5) Non canonical J-HEPTAMER: CACTATG instead of CACTGTG.
- (6) Non canonical J-REGION: Cys-Gly-X-Gly instead of Phe-Gly-X-Gly.
- (7) STOP-CODON in J-REGION.
- (8) Note that the first codon of the germline J-REGION is a STOP-CODON which may disappear during rearrangements.
- (9) Defective DONOR\_SPLICE.

\* These information have been obtained from the following publications:  
 Roman-Roman, S. et al., Eur. J. Immunol., 21, 927-933 (1991).  
 Giachino, C. et al., J. Immunol. Res., 4, 99-105 (1992).  
 Moss, P.A.H. et al., Eur. J. Immunol., 23, 1153-1159 (1993).  
 Roman-Roman, S. et al., Molec. Immun., 30, 423-431 (1993).  
 Koop, B.F. et al., Genomics, 19, 478-493 (1994).

**References:**

- [1] Yoshikai, Y. et al., Nature, 316, 837-839 (1985).
- [2] Baer, R.J. et al., Mol. Biol. Med., 3, 265-277 (1986).
- [3] Finger, L.R. et al., Science, 234, 982-985 (1986).
- [4] Baer, R.J. et al., Cell, 50, 97-105 (1987).
- [5] Mengle-Gaw, L. et al., EMBO J., 6, 2273-2280 (1987).
- [6] Baer, R.J. et al., EMBO J., 7, 1661-1668 (1988).
- [7] Koop, B.F. et al., Genomics, 19, 478-493 (1994).
- [8] Boysen, C. et al., unpublished.

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**Table 2. Human TRAJ allele table**

Fct: FUNCTIONALITY

F: Functional

P: Pseudogene

ORF: Open Reading Frame

vg: Vestigial

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

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

TRAJ name	Fct	TRAJ allele name	Accession number	Confirmed by genetics and/or data	Description of mutations
TRAJ1	ORF	TRAJ1*01	X02884	+	
TRAJ2	ORF	TRAJ2*01	X02884	+	
TRAJ3	F	TRAJ3*01	X02884	+	
TRAJ4	F	TRAJ4*01	M94081		
TRAJ5	F	TRAJ5*01	M94081		
TRAJ6	F	TRAJ6*01	M16747	+	
TRAJ7	F	TRAJ7*01	M94081		
TRAJ8	F	TRAJ8*01	M94081		
TRAJ9	F	TRAJ9*01	M94081		
TRAJ10	F	TRAJ10*01	M94081		
TRAJ11	F	TRAJ11*01	M94081		
TRAJ12	F	TRAJ12*01	X02885	+	
TRAJ13	F	TRAJ13*01	M94081		
TRAJ14	F	TRAJ14*01	M94081		
TRAJ15	F	TRAJ15*01	X05775		a40 ,c41 ,T14  t43
	F	TRAJ15*02	M94081		a40>c,c41>a,T14>H t43>c
TRAJ16	F	TRAJ16*01	M94081		
TRAJ17	F	TRAJ17*01	X05773	+	
TRAJ18	F	TRAJ18*01	M94081		
TRAJ19	ORF	TRAJ19*01	M94081		
TRAJ20	F	TRAJ20*01	M94081		
TRAJ21	F	TRAJ21*01	M94081		
TRAJ22	F	TRAJ22*01	X02886	+	
TRAJ23	F	TRAJ23*01	M94081		
TRAJ24	F	TRAJ24*01	X02887		c24 ,F8  g25 ,E9
	F	TRAJ24*02	M94081		c24>g,F8>L g25>c,E9>Q
TRAJ25	ORF	TRAJ25*01	X02888	+	
TRAJ26	F	TRAJ26*01	M94081		
TRAJ27	F	TRAJ27*01	M94081		
TRAJ28	F	TRAJ28*01	M94081		
TRAJ29	F	TRAJ29*01	X02889	+	
TRAJ30	F	TRAJ30*01	M94081		
TRAJ31	F	TRAJ31*01	M14905	+	
TRAJ32	F	TRAJ32*01	M94081		
TRAJ33	F	TRAJ33*01	M94081		
TRAJ34	F	TRAJ34*01	M35622	+	
TRAJ35	ORF	TRAJ35*01	M94081		

**Table 2** (continued)

TRAJ name	Fct	TRAJ allele name	Accession number	Confirmed by genetics and/or data	Description of mutations
TRAJ36	F	TRAJ36*01	M94081		
TRAJ37	F	TRAJ37*01	M94081		
TRAJ38	F	TRAJ38*01	M94081		
TRAJ39	F	TRAJ39*01	M94081		
TRAJ40	F	TRAJ40*01	M35620	+	
TRAJ41	F	TRAJ41*01	M94081		
TRAJ42	F	TRAJ42*01	M94081		
TRAJ43	F	TRAJ43*01	M94081		
TRAJ44	F	TRAJ44*01	M35619	+	
TRAJ45	F	TRAJ45*01	M94081		
TRAJ46	F	TRAJ46*01	M94081		
TRAJ47	F	TRAJ47*01	M94081		
TRAJ48	F	TRAJ48*01	M94081		
TRAJ49	F	TRAJ49*01	M94081		
TRAJ50	F	TRAJ50*01	M94081		
TRAJ52	F	TRAJ52*01	M94081		
TRAJ53	F	TRAJ53*01	M94081		
TRAJ54	F	TRAJ54*01	M94081		
TRAJ56	F	TRAJ56*01	M94081		
TRAJ57	F	TRAJ57*01	M94081		
TRAJ58	ORF	TRAJ58*01	M94081		
TRAJ59	ORF	TRAJ59*01	M94081		
TRAJ61	ORF	TRAJ61*01	M94081		

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**Table 3. Nucleotide and protein displays of the human TRAJ alleles (overview)**

Only one sequence for each allele is shown. This set of sequences is part of the IMGT reference directory. Other known sequences are shown in the individual Alignments of alleles, at <http://imgt.cines.fr:8104>. When several alleles are shown, the nucleotide mutations are indicated in bold characters, and the amino acid changes in bold characters and underlined. These polymorphic mutations are reported in Table 2 (Table of alleles). Dashes indicate identical nucleotides.

X02884 ,TRAJ1*01	Y E S I T S Q L Q F G K G T R V S T S P
	G TAT GAA AGT ATT ACC TCC CAG TTG CAA TTT GGC AAA GGA ACC AGA GTT TCC ACT TCT CCC C
X02884 ,TRAJ2*01	N T G G T I D K L T F G K G T H V F I I S
	TG ATG ACT GGA GGA ACA ATT GAT AAA CTC ACA TTT GGG AAA GGG ACC CAT GTA TCT ATT ATA TCT G
X02884 ,TRAJ3*01	G Y S S A S K I I F G S G T R L S I R P
	G GGG TAC AGC AGT GCT TCC AAG ATA ATC TTT GGA TCA GGG ACC AGA CTC AGC ATC CGG CCA A
M94081 ,TRAJ4*01	F S G G Y N K L I F G A G T R L A V H P
	TG TTT TCT GGT GGC TAC AAT AAG CTG ATT TTT GGA GCA GGG ACC AGG CTG GCT GTA CAC CCA T
M94081 ,TRAJ5*01	D T G R R A L T F G S G T R L Q V Q P
	TG GAC ACG GGC AGG AGA GCA CTT ACT TTT GGG AGT GGA ACA AGA CTC CAA GTG CAA CCA A
M16747 ,TRAJ6*01	A S G G S Y I P T F G R G T S L I V H P
	T GCA TCA GGA GGA AGC TAC ATA CCT ACA TTT GGA AGA GGA ACC AGC CTT ATT GTT CAT CCG T
M94081 ,TRAJ7*01	D Y G N N R L A F G K G N Q V V V I P
	T GAC TAT GGG AAC AGA CTC GCT TTT GGG AAG GGG AAC CAA GTG GTG GTC ATA CCA A
M94081 ,TRAJ8*01	N T G F Q K L V F G T G T R L L V S P
	TG AAC ACA GGC TTT CAG AAA CCT GTT GCA ACT GGC ACC CGA CCT CTG GTC AGT CCA A
M94081 ,TRAJ9*01	G N T G G F K T I F G A G T R L F V K A
	GGA AAT ACT GGA GGC TTC AAA ACT ATC TTT GGA GCA GGA ACA AGA CTA TTT GTT AAA GCA A
M94081 ,TRAJ10*01	I L T G G N K L T F G T G T Q L K V E L
	ATA CTC ACG GGA GGA GGA AAC AAA CTC ACC TTT GGG ACA GGC ACT CGAG CTA AAA GTG GAA CTC A
M94081 ,TRAJ11*01	N S G Y S T L T F G K G T M L L V S P
	TG AAT TCA GGA TAC AGC ACC CTC ACC TTT GGG AAG GGG ACT ATG CCT CTA GTC TCT CCA G
X02885 ,TRAJ12*01	M D S S Y K L I F G S G T R L L V R P
	GG ATG GAT AGC AGC TAT AAA TTG ATC TTC GGG AGT GGG ACC AGA CTG CTG GTC AGG CCT G
M94081 ,TRAJ13*01	N S G G Y Q K V T F G I G T K L Q V I P
	TG AAT TCT GGG GGT TAC CRG AAA GTT ACC TTT GGA ATT GGA ACA AAG CTC CAA GTC ATC CCA A



Table 3 (continued)

X02889 ,TRAJ29*01	GG AAT TCA GGA AAC ACA CCT CTT GTC TTT GGA AAG GGC ACA CGA CTT CAT ATT CTC CCC A
M94081 ,TRAJ30*01	N R D D K I F G K G T R L H I L P
M14905 ,TRAJ31*01	N N N A R L M F G D G T Q L V V K P
M94081 ,TRAJ32*01	G AAT AAC ATG GCC AGA CTC ATG TTT GGA GAT GGA ACT CG AGT GTG GTG AAG CCC A
M94081 ,TRAJ33*01	TG AAT TAT GGC GGT GCT ACA AAC AAG CTC ATC TTT GGA ACT GG ACT CTG CTT GCT GTC CAG CCA A
M35622 ,TRAJ34*01	D S N Y Q L I W G A G T K L I I K P
M94081 ,TRAJ35*01	TG GAT AGC AAC TAT CAG TTA ATC TGG GGC GCT GGG ACC AAG CTA ATT ATA AAG CCA G
M94081 ,TRAJ36*01	S Y N T D K L I F G T G T R L Q V F P
M94081 ,TRAJ37*01	TCT TAT AAC ACC GAC AAC CTC ATC ATC TTT GGG ACT GGG ACC AGA TTA CAA GTC TTT CCA A
M94081 ,TRAJ38*01	I G F G N V L H C G S G T Q V I V L P
M94081 ,TRAJ39*01	G ATA GGC TTT GGG AAT GTG CTG CAT TGC GGG TCC GGC ACT CAA GTG ATT GTT TTA CCA C
M35620 ,TRAJ40*01	Q T G A N N L F F G T G T R L T V I P
M94081 ,TRAJ41*01	T CAA ACT GGG GCA AAC AAC CTC TTC TTT GGG ACT GGA ACG AGA CTC ACC GTT ATT CCC T
M94081 ,TRAJ42*01	G S G N T G K L I F G Q G T T L Q V K P
M94081 ,TRAJ43*01	T GGC TCT GGC AAC ACA GGC AAA CTA ATC TTT GGG CAA GGG ACA ACT TTA CAA GTT AAA CCA G
M35619 ,TRAJ44*01	N A G N R K L I W G L G T S L A V N P
M94081 ,TRAJ45*01	N N N A G N M L T F G G T R L M V K P
M94081 ,TRAJ46*01	TG AAT ATT AAT GCA GGC AAC ATG CTC ACC TTT GGA GGG GGA ACA AGG TTA ATG GTC AAA CCC C
M94081 ,TRAJ47*01	T T S G T Y K Y I F G T G T R L K V L A
M94081 ,TRAJ48*01	ACT ACC TCA GGA ACC TAC AAA TAC ATC TTT GGA ACA GGC ACC AGG CTG AAG GTT TTA GCA A
M94081 ,TRAJ49*01	N S N S G Y A L N F G K G T S L L V T P
M94081 ,TRAJ50*01	G AAC TCA AAT TCC GGG TAT GCA CTC AAC TTC GGC AAA GGC ACC TCG CTG AAG GTT AAA CCA C
M94081 ,TRAJ51*01	N Y G S Q G N L I F G K G T R L T V K P
M94081 ,TRAJ52*01	TG AAT TAT GGA GGA AGC CAA GGA AAT CTC ATC TTT GGA AAA GGC ACT AAA CTC TCT GTT AAA CCA A
M94081 ,TRAJ53*01	N N N D M R F G A G T R L T V K P
M94081 ,TRAJ54*01	AC AAT AAC AAT GAC ATG CGC TCG ATT GGA GCA GGG ACC AGA CTG ACA GTA AAA CCA A
M35619 ,TRAJ55*01	N T G T A S K L T F G T R L Q V T L

94081 ,TRAJ45*01	Y S G G A D G L T F G K G T H L I I Q P
94081 ,TRAJ46*01	TG TAT TCA GGA GGA GGT GCT GAC GGA CTC ACC TTT GGC AAA GGG ACT CAT CTA ATC ATC CAG CCC T K K S S G D K L T F G T R L A V R P AG AAG AAA AGC AGC GGA GAC AAG CTG ACT TTT GGG ACC GGG ACT CGT TTA GCA GTT AGG CCC A
94081 ,TRAJ47*01	E Y G N K L V F G A G T I L R V K S TG GAA TAT GGA AAC AAA CTG GTC TTT GGC GCA GGA ACC ATT CTG AGA GTC AAG TCC T
M94081 ,TRAJ48*01	S N F G N E K L T F G T R L T I I P TA TCT AAC TTT GGA ATT GAG AAA TTA ACC TTT GGG ACT GGA ACA AGA CTC ACC ATC ATA CCC A
M94081 ,TRAJ49*01	N T G N Q F Y F G T G T S L T V I P G AAC ACC GGT AAC CAG TTC TAT TTT GGG ACA GGG ACA AGT TTG ACG GTC ATT CCA A
M94081 ,TRAJ50*01	K T S Y D K V I F G P G T S L S V I P TG AAA ACC TCC TAC GAC AAG GTG ATA TTT GGG CCA GGG ACA AGC TTA TCA GTC ATT CCA A
M94081 ,TRAJ52*01	N A G G T S Y G K L T F G Q G T I L T V H P CT AAT GCT GGT ACT AGC TAT GGA AAG CTG ACA TTT GGA CAA GGG ACC ATC TTG ACT GTC CAT CCA A
M94081 ,TRAJ53*01	N S G G S N Y K L T F G K G T L L T V N P AG AAT AGT GGA GGT AGC AAC TAT AAA CTG ACA TTT GGA AAA GGA ACT CTC TTA ACC GTG AAT CCA A
M94081 ,TRAJ54*01	I Q G A Q K L V F G Q G T R L T I N P TA ATT CAG GGA GCC CAG AAG CTG GTA TTT GGC CAA GGA ACC AGG CTG ACT ATC AAC CCA A
M94081 ,TRAJ56*01	Y T G A N S K L T F G K G I T L S V R P T TAT ACT GGA GCC ATT AGT AAG CTG ACA TTT GGA AAA GGA ATA ACT CTG AGT GTT AGA CCA G
M94081 ,TRAJ57*01	T Q G G S E K L V F G K G T K L T V N P TA ACT CAG GGC GGA TCT GAA AAG CTG GTC TTT GGA AAG GGA AGC AAA CTG AGA AAC CCA T
M94081 ,TRAJ58*01 (1)	* E T S G S R L T F G E G T Q L T V N P TT TAA GAA ACC AGT GGC TCA TGG TTG ACC TTT GGG GAA GGA ACA CAG CTC ACA GTG AAT CCT G
M94081 ,TRAJ59*01	K E G N R K F T F G M G T Q V R V GG AAG GAA AAC AGG AAA TTT ACA TTT GGA ATG GGG ACG CAA GTG AGA GTG A
M94081 ,TRAJ61*01	Y R V N R K L T F G A N T R G I M K L GG TAC CGG GTT ATT AGG AAA CTG ACA TTT GGA GCC AAC ACT AGA GGA ATC ATG AAA CTC A

**IMGT note:**

(1) The first codon of the J-REGION is a STOP-CODON which may disappear during rearrangements.

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## References

- 1 Lefranc MP: IMGT Locus on focus. *Exp Clin Immunogenet* 1998;15:1–7.
- 2 Pallarès N, Frippiat JP, Giudicelli V, Lefranc MP: The human immunoglobulin lambda variable (IGLV) genes and joining (IGLJ) segments. *Exp Clin Immunogenet* 1998;15:8–18.
- 3 Barbié V, Lefranc MP: The human immunoglobulin kappa variable (IGKV) genes and joining (IGKJ) segments. *Exp Clin Immunogenet* 1998;15:171–183.
- 4 Pallarès N, Lefebvre S, Contet V, Matsuda F, Lefranc MP: The human immunoglobulin heavy variable (IGHV) Genes. *Exp Clin Immunogenet* 1999;16:36–60.
- 5 Ruiz M, Pallarès N, Contet V, Barbié V, Lefranc MP: The human immunoglobulin heavy diversity (IGHD) and Joining (IGHJ) segments. *Exp Clin Immunogenet* 1999;16:173–184.
- 6 Scaviner D, Barbié V, Ruiz M, Lefranc MP: Protein displays of the human immunoglobulin heavy, kappa and lambda variable and joining regions. *Exp Clin Immunogenet* 1999;16:234–240.
- 7 Folch G, Lefranc MP: The human T cell receptor beta variable (TRBV) genes. *Exp Clin Immunogenet* 2000;17:42–54.
- 8 Scaviner D, Lefranc MP: The human T cell receptor alpha variable (TRA $\gamma$ ) genes. *Exp Clin Immunogenet* 2000;17:83–96.
- 9 Lefranc MP, Giudicelli V, Ginestoux C, Bodmer J, Müller W, Bontrup R, Lemaitre M, Malik A, Barbié V, Chaume D: IMGT, the international ImMunoGeneTics database. *Nucleic Acids Res* 1999;27:209–212.
- 10 Ruiz M, Giudicelli V, Ginestoux C, Stoehr P, Robinson J, Bodmer J, Marsh S, Bontrup R, Lemaitre M, Lefranc G, Chaume D, Lefranc MP: IMGT, the international ImMunoGeneTics database. *Nucleic Acids Res* 2000;28:219–221.