



## Full wwPDB X-ray Structure Validation Report ⓘ

May 13, 2020 – 01:07 pm BST

PDB ID : 1S7Q  
Title : Crystal structures of the murine class I major histocompatibility complex H-2Kb in complex with LCMV-derived gp33 index peptide and three of its escape variants  
Authors : Velloso, L.M.; Michaelsson, J.; Ljunggren, H.G.; Schneider, G.; Achour, A.  
Deposited on : 2004-01-30  
Resolution : 1.99 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.11
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

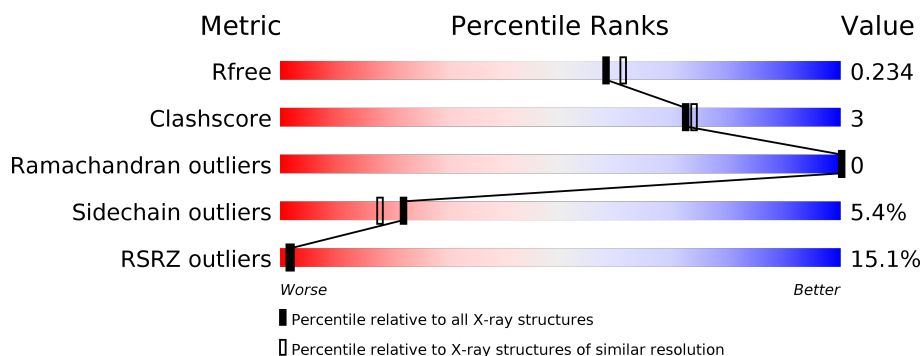
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.99 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	8085 (2.00-2.00)
Clashscore	141614	9178 (2.00-2.00)
Ramachandran outliers	138981	9054 (2.00-2.00)
Sidechain outliers	138945	9053 (2.00-2.00)
RSRZ outliers	127900	7900 (2.00-2.00)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	348	<div> <div>11%</div> <div> <div></div> <div>70%</div> <div>9%</div> <div>21%</div> </div> </div>
2	B	99	<div> <div>13%</div> <div> <div></div> <div>90%</div> <div>8%</div> </div> </div>
3	C	9	<div> <div>78%</div> <div> <div></div> <div>78%</div> <div>11%</div> <div>11%</div> </div> </div>

## 2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 3388 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called H-2 class I histocompatibility antigen, K-B alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	276	Total	C	N	O	S	0	0	0
			2247	1418	395	425	9			

- Molecule 2 is a protein called Beta-2-microglobulin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	99	Total	C	N	O	S	0	0	0
			820	524	138	151	7			

- Molecule 3 is a protein called Glycoprotein 9-residue peptide.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	8	Total	C	N	O	S	0	0	0
			63	42	9	11	1			

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	9	MET	CYS	SEE REMARK 999	UNP P07399

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	178	Total	O	0	0
			178	178		
4	B	73	Total	O	0	0
			73	73		
4	C	7	Total	O	0	0
			7	7		



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	88.22Å 135.87Å 45.17Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	37.53 – 1.99 37.00 – 1.99	Depositor EDS
% Data completeness (in resolution range)	98.8 (37.53-1.99) 98.8 (37.00-1.99)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.41 (at 1.98Å)	Xtriage
Refinement program	REFMAC 5.1.24	Depositor
R, $R_{free}$	0.181 , 0.209 0.211 , 0.234	Depositor DCC
$R_{free}$ test set	1893 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	20.1	Xtriage
Anisotropy	0.136	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.40 , 58.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	3388	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	20.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.85% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 5$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z  > 5$	RMSZ	$\# Z  > 5$
1	A	0.67	0/2309	0.83	5/3137 (0.2%)
2	B	0.67	0/846	0.83	2/1148 (0.2%)
3	C	0.95	0/64	1.04	0/86
All	All	0.67	0/3219	0.84	7/4371 (0.2%)

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	272	LEU	CA-CB-CG	6.53	130.32	115.30
1	A	197	ASP	CB-CG-OD2	6.39	124.05	118.30
1	A	29	ASP	CB-CG-OD2	5.92	123.63	118.30
2	B	76	ASP	CB-CG-OD2	5.80	123.52	118.30
1	A	227	ASP	CB-CG-OD2	5.80	123.52	118.30
2	B	85	ASP	CB-CG-OD2	5.64	123.37	118.30
1	A	137	ASP	CB-CG-OD2	5.13	122.92	118.30

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2247	0	2136	18	0
2	B	820	0	796	4	0
3	C	63	0	58	3	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	A	178	0	0	4	0
4	B	73	0	0	2	0
4	C	7	0	0	0	0
All	All	3388	0	2990	21	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 3.

All (21) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:74:GLU:HG2	4:B:127:HOH:O	1.95	0.67
1:A:263:HIS:CD2	1:A:265:GLY:H	2.16	0.64
1:A:263:HIS:HD2	1:A:265:GLY:H	1.45	0.63
1:A:259:CYS:HB3	1:A:272:LEU:HD13	1.84	0.60
1:A:151:GLY:O	1:A:154:GLU:HG2	2.01	0.60
1:A:171:TYR:OH	3:C:2:ALA:CB	2.50	0.60
1:A:86:ASN:ND2	4:A:428:HOH:O	2.35	0.59
1:A:275:GLU:HG2	1:A:275:GLU:O	2.02	0.59
2:B:31:HIS:ND1	4:B:159:HOH:O	2.32	0.58
1:A:171:TYR:OH	3:C:2:ALA:HB2	2.04	0.57
1:A:210:PRO:O	1:A:263:HIS:HE1	1.90	0.53
1:A:189:VAL:HG23	1:A:272:LEU:HD22	1.91	0.52
2:B:73:THR:HB	2:B:76:ASP:OD2	2.10	0.52
1:A:117:ALA:HB2	2:B:60:TRP:CE2	2.47	0.50
1:A:12:VAL:HG23	4:A:487:HOH:O	2.14	0.47
1:A:275:GLU:CG	1:A:275:GLU:O	2.63	0.46
1:A:171:TYR:OH	3:C:2:ALA:HB3	2.16	0.45
1:A:65:GLN:HG3	4:A:489:HOH:O	2.17	0.45
1:A:215:LEU:CD2	1:A:261:VAL:HG22	2.50	0.42
1:A:186:LYS:HE2	4:A:434:HOH:O	2.19	0.42
1:A:217:TRP:H	1:A:228:MET:HE1	1.86	0.41

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	274/348 (79%)	269 (98%)	5 (2%)	0	100	100
2	B	97/99 (98%)	97 (100%)	0	0	100	100
3	C	6/9 (67%)	6 (100%)	0	0	100	100
All	All	377/456 (83%)	372 (99%)	5 (1%)	0	100	100

There are no Ramachandran outliers to report.

### 5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	234/290 (81%)	221 (94%)	13 (6%)	21	17
2	B	94/94 (100%)	89 (95%)	5 (5%)	22	18
3	C	6/7 (86%)	6 (100%)	0	100	100
All	All	334/391 (85%)	316 (95%)	18 (5%)	22	18

All (18) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	41	GLU
1	A	44	ARG
1	A	45	TYR
1	A	79	ARG
1	A	108	ARG

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Mol	Chain	Res	Type
1	A	110	LEU
1	A	114	GLN
1	A	154	GLU
1	A	222	GLU
1	A	226	GLN
1	A	255	GLN
1	A	272	LEU
1	A	275	GLU
2	B	48	LYS
2	B	56	PHE
2	B	58	LYS
2	B	70	PHE
2	B	73	THR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	72	GLN
1	A	86	ASN
1	A	115	GLN
1	A	226	GLN
1	A	263	HIS
1	A	264	GLN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

### 5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

### 5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

### 5.6 Ligand geometry [i](#)

There are no ligands in this entry.

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data

### 6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	276/348 (79%)	1.03	38 (13%) <b>2</b> <b>2</b>	10, 18, 36, 48	0
2	B	99/99 (100%)	1.04	13 (13%) <b>3</b> <b>3</b>	12, 18, 29, 35	0
3	C	8/9 (88%)	3.09	7 (87%) <b>0</b> <b>0</b>	20, 22, 24, 26	0
All	All	383/456 (83%)	1.07	58 (15%) <b>2</b> <b>1</b>	10, 18, 33, 48	0

All (58) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	226	GLN	7.4
1	A	225	ILE	7.1
1	A	256	TYR	6.6
1	A	220	ASN	6.5
1	A	196	GLU	6.4
2	B	1	ILE	6.0
1	A	41	GLU	5.3
1	A	227	ASP	5.2
2	B	88	ALA	5.1
2	B	48	LYS	4.7
1	A	276	PRO	4.4
1	A	195	PRO	4.3
1	A	222	GLU	4.3
1	A	274	TRP	4.1
3	C	2	ALA	4.0
3	C	3	VAL	4.0
1	A	255	GLN	3.9
1	A	253	LYS	3.8
1	A	42	ASN	3.8
1	A	221	GLY	3.7
1	A	224	LEU	3.6
1	A	197	ASP	3.6
1	A	275	GLU	3.6

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Mol	Chain	Res	Type	RSRZ
3	C	6	PHE	3.4
1	A	252	GLY	3.3
2	B	74	GLU	3.1
1	A	89	LYS	3.1
3	C	9	MET	3.1
1	A	86	ASN	3.0
3	C	4	TYR	2.9
2	B	16	GLU	2.8
3	C	7	ALA	2.8
1	A	88	SER	2.8
2	B	18	GLY	2.8
3	C	8	THR	2.7
1	A	228	MET	2.7
2	B	4	THR	2.7
1	A	15	PRO	2.7
1	A	273	ARG	2.7
2	B	85	ASP	2.6
2	B	2	GLN	2.6
1	A	9	VAL	2.5
1	A	74	PHE	2.5
1	A	97	VAL	2.4
1	A	219	LEU	2.4
2	B	89	GLU	2.4
2	B	17	ASN	2.4
2	B	47	PRO	2.4
1	A	58	GLU	2.3
1	A	199	VAL	2.3
1	A	79	ARG	2.3
1	A	250	PRO	2.2
1	A	25	VAL	2.2
2	B	94	TYR	2.2
1	A	128	GLU	2.2
1	A	176	ASN	2.1
1	A	198	LYS	2.1
1	A	249	VAL	2.0

## 6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

### 6.3 Carbohydrates [i](#)

There are no carbohydrates in this entry.

### 6.4 Ligands [i](#)

There are no ligands in this entry.

### 6.5 Other polymers [i](#)

There are no such residues in this entry.