



wwPDB X-ray Structure Validation Summary Report

Aug 12, 2024 – 04:36 PM EDT

PDB ID : 9CYL
Title : Structure of LAG3 loop1 deletion bound to the MHC class II molecule I-A(b)
Authors : Ming, Q.; Tran, T.H.; Antfolk, D.; Luca, V.C.
Deposited on : 2024-08-02
Resolution : 4.66 Å(reported)

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

We welcome your comments at 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.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.37.1
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) : 2.37.1

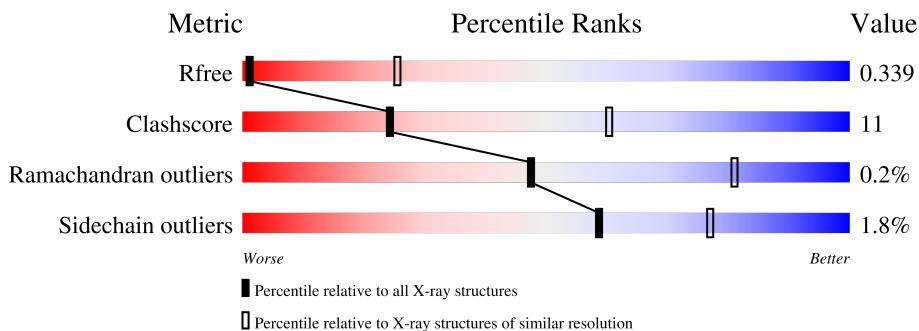
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 4.66 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	1083 (5.52-3.80)
Clashscore	141614	1156 (5.52-3.80)
Ramachandran outliers	138981	1092 (5.52-3.80)
Sidechain outliers	138945	1072 (5.50-3.80)

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 of the lower bar indicate the fraction of residues that contain outliers for ≥ 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 $\leq 5\%$.

Mol	Chain	Length	Quality of chain
1	A	195	74% (green), 20% (yellow), 5% (grey)
2	B	192	65% (green), 33% (yellow), 1% (grey)
3	P	15	87% (green), 13% (yellow)
4	L	210	70% (green), 26% (yellow), 2% (grey)

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 4699 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 II histocompatibility antigen, A-B alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	185	1479	957	233	286	3	0	0	0

- Molecule 2 is a protein called H-2 class II histocompatibility antigen, A beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	188	1557	975	283	292	7	0	0	0

- Molecule 3 is a protein called Class-II-associated invariant chain peptide.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	P	15	113	72	20	18	3	0	0	0

- Molecule 4 is a protein called Secreted lymphocyte activation gene 3 protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	L	202	1494	951	268	270	5	0	0	0

There are 22 discrepancies between the modelled and reference sequences:

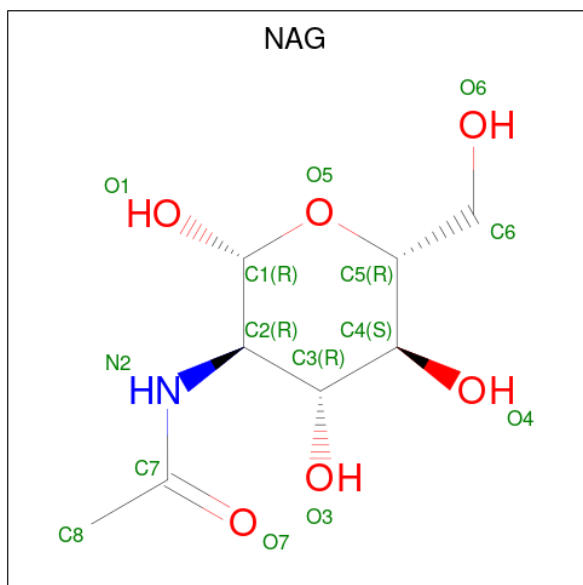
Chain	Residue	Modelled	Actual	Comment	Reference
L	?	-	GLN	deletion	UNP Q61790
L	?	-	PRO	deletion	UNP Q61790
L	?	-	THR	deletion	UNP Q61790
L	?	-	PRO	deletion	UNP Q61790
L	?	-	ILE	deletion	UNP Q61790
L	?	-	PRO	deletion	UNP Q61790
L	?	-	ALA	deletion	UNP Q61790
L	?	-	LEU	deletion	UNP Q61790

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Chain	Residue	Modelled	Actual	Comment	Reference
L	?	-	ASP	deletion	UNP Q61790
L	?	-	LEU	deletion	UNP Q61790
L	?	-	HIS	deletion	UNP Q61790
L	?	-	GLN	deletion	UNP Q61790
L	?	-	GLY	deletion	UNP Q61790
L	?	-	MET	deletion	UNP Q61790
L	?	-	PRO	deletion	UNP Q61790
L	?	-	SER	deletion	UNP Q61790
L	?	-	PRO	deletion	UNP Q61790
L	?	-	ARG	deletion	UNP Q61790
L	?	-	GLN	deletion	UNP Q61790
L	?	-	PRO	deletion	UNP Q61790
L	?	-	ALA	deletion	UNP Q61790
L	?	-	PRO	deletion	UNP Q61790

- Molecule 5 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).

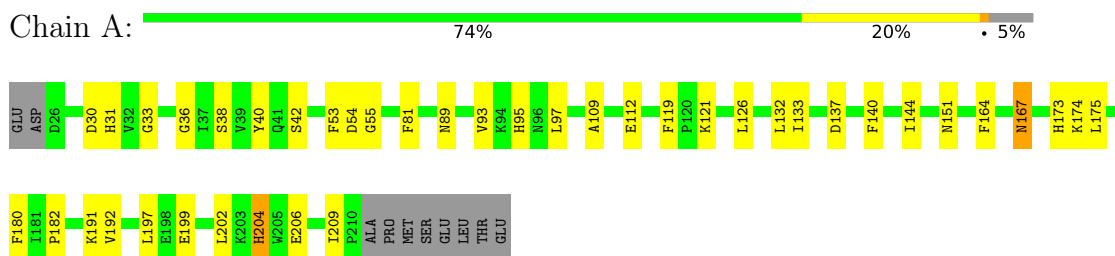


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
5	A	1	Total	C	N	O	0	0
			14	8	1	5		
5	B	1	Total	C	N	O	0	0
			14	8	1	5		
5	L	1	Total	C	N	O	0	0
			14	8	1	5		
5	L	1	Total	C	N	O	0	0
			14	8	1	5		

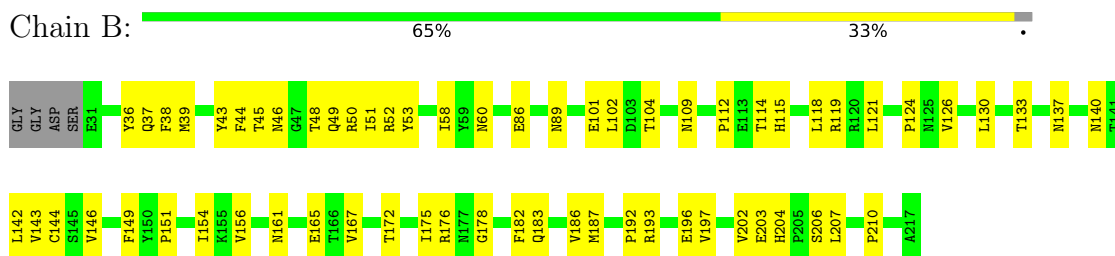
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

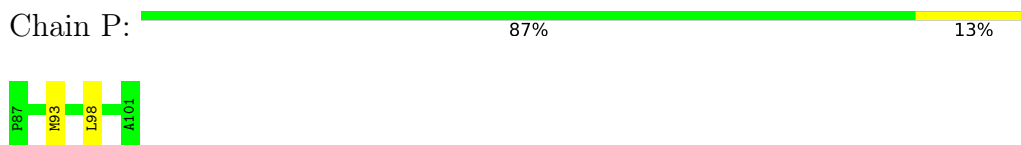
- Molecule 1: H-2 class II histocompatibility antigen, A-B alpha chain



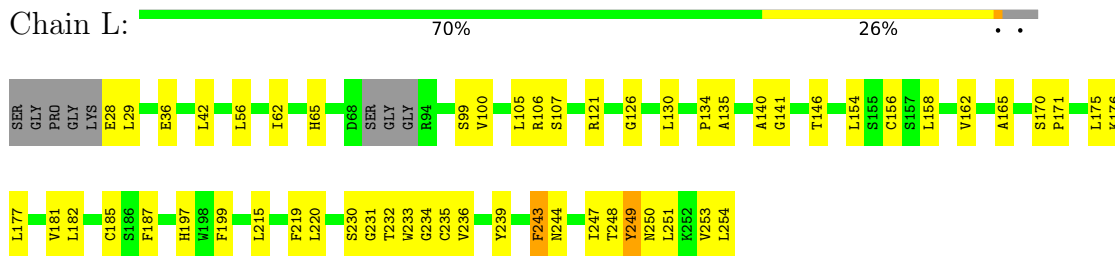
- Molecule 2: H-2 class II histocompatibility antigen, A beta chain



- Molecule 3: Class-II-associated invariant chain peptide



- Molecule 4: Secreted lymphocyte activation gene 3 protein



4 Data and refinement statistics

Property	Value	Source
Space group	P 65 2 2	Depositor
Cell constants a, b, c, α , β , γ	184.99Å 184.99Å 122.67Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	92.50 – 4.66 92.50 – 4.66	Depositor EDS
% Data completeness (in resolution range)	99.8 (92.50-4.66) 99.9 (92.50-4.66)	Depositor EDS
R_{merge}	0.19	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.32 (at 4.66Å)	Xtrriage
Refinement program	PHENIX (1.21.1_5286: ???)	Depositor
R, R_{free}	0.268 , 0.326 0.276 , 0.339	Depositor DCC
R_{free} test set	351 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	232.6	Xtrriage
Anisotropy	0.244	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.26 , 230.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.41$, $\langle L^2 \rangle = 0.24$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.89	EDS
Total number of atoms	4699	wwPDB-VP
Average B, all atoms (Å ²)	246.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.44% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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](#)

Bond lengths and bond angles in the following residue types are not validated in this section: NAG

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	0.26	0/1524	0.44	0/2083
2	B	0.28	0/1597	0.54	0/2173
3	P	0.23	0/114	0.51	0/151
4	L	0.36	0/1536	0.53	0/2111
All	All	0.30	0/4771	0.51	0/6518

There are no bond length outliers.

There are no bond angle outliers.

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	1479	0	1398	33	0
2	B	1557	0	1470	45	0
3	P	113	0	128	2	0
4	L	1494	0	1401	36	0
5	A	14	0	13	0	0
5	B	14	0	13	0	0
5	L	28	0	26	1	0
All	All	4699	0	4449	101	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 11.

The worst 5 of 101 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)
1:A:204:HIS:O	1:A:204:HIS:ND1	2.04	0.90
4:L:232:THR:HA	4:L:250:ASN:HA	1.54	0.90
1:A:204:HIS:ND1	1:A:204:HIS:C	2.25	0.89
2:B:48:THR:HA	2:B:51:ILE:HD11	1.68	0.75
2:B:109:ASN:HA	2:B:112:PRO:HD2	1.72	0.71

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	183/195 (94%)	179 (98%)	4 (2%)	0	100	100
2	B	186/192 (97%)	173 (93%)	13 (7%)	0	100	100
3	P	13/15 (87%)	13 (100%)	0	0	100	100
4	L	198/210 (94%)	178 (90%)	19 (10%)	1 (0%)	29	68
All	All	580/612 (95%)	543 (94%)	36 (6%)	1 (0%)	47	81

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
4	L	134	PRO

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	165/175 (94%)	162 (98%)	3 (2%)	59	77
2	B	170/175 (97%)	169 (99%)	1 (1%)	86	92
3	P	13/13 (100%)	13 (100%)	0	100	100
4	L	154/181 (85%)	149 (97%)	5 (3%)	39	62
All	All	502/544 (92%)	493 (98%)	9 (2%)	59	77

5 of 9 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
4	L	243	PHE
4	L	249	TYR
2	B	50	ARG
4	L	156	CYS
4	L	235	CYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	167	ASN

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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

4 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	NAG	A	301	1	14,14,15	0.73	0	17,19,21	0.94	1 (5%)
5	NAG	L	301	4	14,14,15	0.40	0	17,19,21	1.03	2 (11%)
5	NAG	B	301	2	14,14,15	0.72	0	17,19,21	0.91	0
5	NAG	L	302	4	14,14,15	0.77	0	17,19,21	2.17	2 (11%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	NAG	A	301	1	-	4/6/23/26	0/1/1/1
5	NAG	L	301	4	-	2/6/23/26	0/1/1/1
5	NAG	B	301	2	-	2/6/23/26	0/1/1/1
5	NAG	L	302	4	-	5/6/23/26	0/1/1/1

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	L	302	NAG	C2-N2-C7	7.60	133.73	122.90
5	L	301	NAG	O5-C1-C2	3.13	116.24	111.29
5	L	302	NAG	C8-C7-N2	2.82	120.88	116.10
5	L	301	NAG	C1-O5-C5	2.56	115.66	112.19
5	A	301	NAG	C1-O5-C5	2.03	114.94	112.19

There are no chirality outliers.

5 of 13 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	L	302	NAG	O5-C5-C6-O6
5	A	301	NAG	O5-C5-C6-O6

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Mol	Chain	Res	Type	Atoms
5	A	301	NAG	C4-C5-C6-O6
5	L	302	NAG	C4-C5-C6-O6
5	A	301	NAG	C8-C7-N2-C2

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	L	302	NAG	1	0

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

Unable to reproduce the depositors R factor - this section is therefore empty.

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

Unable to reproduce the depositors R factor - this section is therefore empty.

6.3 Carbohydrates

Unable to reproduce the depositors R factor - this section is therefore empty.

6.4 Ligands

Unable to reproduce the depositors R factor - this section is therefore empty.

6.5 Other polymers

Unable to reproduce the depositors R factor - this section is therefore empty.