W O R L D W I D E
wwPDB
P R O T E I N   D A T A   B A N K

wwPDB X-ray Structure Validation Summary Report (i)

May 22, 2020 – 05:42 am BST

PDB ID	:	3MLS
Title	:	Crystal structure of anti-HIV-1 V3 mAb 2557 Fab in complex with a HIV-1 gp120 V3 mimotope
Authors	:	Kong, X.-P.
Deposited on	:	2010-04-18
Resolution	:	2.50 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 (i) symbol.

The following versions of software and data (see references (1)) were used in the production of this report:

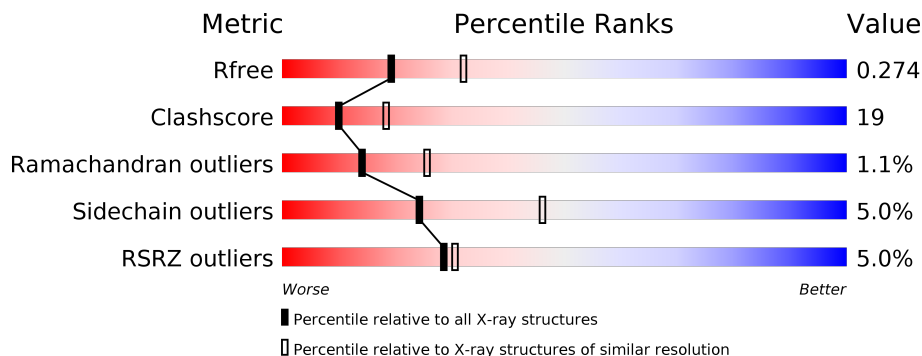|		
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.11
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation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

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.50 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	Percentile Ranks	Value
Rfree		0.274
Clashscore		19
Ramachandran outliers		1.1%
Sidechain outliers		5.0%
RSRZ outliers		5.0%

Worse — *Better*

■ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (2.50-2.50)

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 >=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 <=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	L	219	8% — 68% / 30% / •
1	M	219	7% — 64% / 34% / •
1	N	219	2% — 73% / 23% / •
1	O	219	4% — 65% / 32% / •
2	H	226	3% — 71% / 27% / •
2	I	226	3% — 67% / 28% / •

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Mol	Chain	Length	Quality of chain
2	J	226	6% / 64% / 32% / •
2	K	226	5% / 65% / 31% / ••
3	P	20	15% / 75% / 25%
3	Q	20	20% / 50% / 50%
3	R	20	15% / 65% / 30% / 5%
3	S	20	5% / 50% / 40% / 10%

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 14646 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 Human monoclonal anti-HIV-1 gp120 V3 antibody 2557 Fab light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	L	219	Total	C	N	O	S	0	0	0
			1640	1029	269	337	5			
1	M	219	Total	C	N	O	S	0	0	0
			1640	1029	269	337	5			
1	N	219	Total	C	N	O	S	0	0	0
			1640	1029	269	337	5			
1	O	219	Total	C	N	O	S	0	0	0
			1640	1029	269	337	5			

- Molecule 2 is a protein called Human monoclonal anti-HIV-1 gp120 V3 antibody 2557 Fab heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	H	226	Total	C	N	O	S	0	0	0
			1703	1083	275	339	6			
2	I	226	Total	C	N	O	S	0	0	0
			1703	1083	275	339	6			
2	J	226	Total	C	N	O	S	0	0	0
			1703	1083	275	339	6			
2	K	224	Total	C	N	O	S	0	0	0
			1688	1074	272	336	6			

- Molecule 3 is a protein called Rationally designed V3 mimotope.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	P	20	Total	C	N	O	S	0	0	0
			145	90	27	26	2			
3	Q	20	Total	C	N	O	S	0	0	0
			145	90	27	26	2			
3	R	20	Total	C	N	O	S	0	0	0
			145	90	27	26	2			

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	S	20	145	90	27	26	2	0	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	L	72	Total	O	0	0
			72	72		
4	H	89	Total	O	0	0
			89	89		
4	P	6	Total	O	0	0
			6	6		
4	M	63	Total	O	0	0
			63	63		
4	I	71	Total	O	0	0
			71	71		
4	Q	7	Total	O	0	0
			7	7		
4	N	89	Total	O	0	0
			89	89		
4	J	81	Total	O	0	0
			81	81		
4	R	15	Total	O	0	0
			15	15		
4	O	118	Total	O	0	0
			118	118		
4	K	90	Total	O	0	0
			90	90		
4	S	8	Total	O	0	0
			8	8		

3 Residue-property plots ⓘ

These plots are drawn for all protein, RNA and DNA 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 and electron density. 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. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). 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: Human monoclonal anti-HIV-1 gp120 V3 antibody 2557 Fab light chain

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Chain O:

• Molecule 2: Human monoclonal anti-HIV-1 gp120 V3 antibody 2557 Fab heavy chain

Chain H:
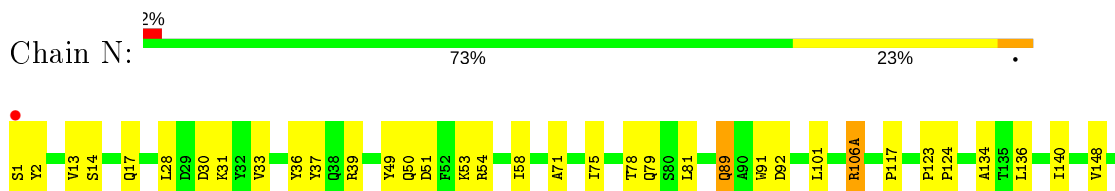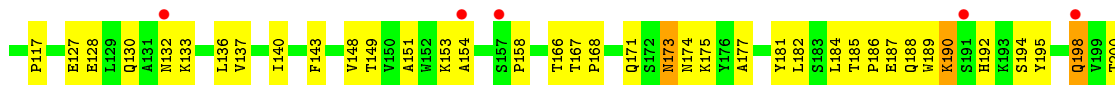

• Molecule 2: Human monoclonal anti-HIV-1 gp120 V3 antibody 2557 Fab heavy chain

Chain I:

• Molecule 2: Human monoclonal anti-HIV-1 gp120 V3 antibody 2557 Fab heavy chain

Chain J:

C196 N197 K201 P202 S203 N204 K209 K210 V211 E212 P213 K214 S215

• Molecule 2: Human monoclonal anti-HIV-1 gp120 V3 antibody 2557 Fab heavy chain

Chain K:

5%
65% 31%

E1 V2 Q3 L4 K12 G15 Q16 S17 L18 K19 I20 F29 L30 D31 I34 R38 Q39 I40 P41 W47 Y52 P52A D53 D54 S55 S60 F63 Q66 V67 Y79 L80 T82B L82C Q83 D86 T87 G88 T93 R94 L97 F98 E99 G100 A100A Q100B

F100G D101 L102 I109 L110 V111 T115 P119 P123 P126 S127 S128 K129 S130 T131 S132 G133 G134 T135 L138 L141 V142 K143 D144 Y145 F146 P147 E148 P149 V150 L159 V169 Y176 S177 L178 V184 P185 S186 S187 S188 L189 T193 Y194 I195 C196 N197

H200 K201 P202 K209 K210 V211 E212 P213 LYS SER

• Molecule 3: Rationally designed V3 mimotope

Chain P:

15%
75% 25%

A1 F5 Y6 A7 S8 S9 P10 R11 K12 I16 A20

• Molecule 3: Rationally designed V3 mimotope

Chain Q:

20%
50% 50%

A1 C2 Q3 A4 F5 Y6 S9 P10 R11 K12 S13 I16 C19 A20

• Molecule 3: Rationally designed V3 mimotope

Chain R:

15%
65% 30% 5%

A1 C2 F5 Y6 K12 I16 C19 A20

• Molecule 3: Rationally designed V3 mimotope

Chain S:

5%
50% 40% 10%

A1 C2 F5 Y6 R11 K12 S13 I16 C19 A20

4   Data and refinement statistics (i)

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	168.75Å 43.05Å 274.34Å 90.00° 94.20° 90.00°	Depositor
Resolution (Å)	50.00 – 2.50 47.49 – 2.49	Depositor EDS
% Data completeness (in resolution range)	87.3 (50.00-2.50) 87.0 (47.49-2.49)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$<I/\sigma(I)>$ [1]	4.36 (at 2.48Å)	Xtriage
Refinement program	CNS	Depositor
R, R_{free}	0.216 , 0.274 0.216 , 0.274	Depositor DCC
R_{free} test set	6410 reflections (10.10%)	wwPDB-VP
Wilson B-factor (Å^2)	27.5	Xtriage
Anisotropy	0.432	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 47.1	EDS
L-test for twinning[2]	$<|L|> = 0.47$, $<L^2> = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	14646	wwPDB-VP
Average B, all atoms (Å^2)	28.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 43.38 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 1.7796e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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[1] Intensities estimated from amplitudes.

[2] Theoretical values of $<|L|>$, $<L^2>$ 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	L	0.33	0/1680	0.63	0/2292
1	M	0.34	0/1680	0.64	0/2292
1	N	0.34	0/1680	0.63	0/2292
1	O	0.34	0/1680	0.64	0/2292
2	H	0.37	0/1747	0.67	0/2380
2	I	0.36	0/1747	0.66	0/2380
2	J	0.37	0/1747	0.66	0/2380
2	K	0.36	0/1732	0.68	0/2361
3	P	0.37	0/148	0.56	0/197
3	Q	0.37	0/148	0.57	0/197
3	R	0.40	0/148	0.67	0/197
3	S	0.42	0/148	0.59	0/197
All	All	0.36	0/14285	0.65	0/19457

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	L	1640	0	1599	60	0
1	M	1640	0	1599	82	0
1	N	1640	0	1599	56	0
1	O	1640	0	1599	68	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	H	1703	0	1662	63	0
2	I	1703	0	1662	60	0
2	J	1703	0	1662	83	0
2	K	1688	0	1644	60	0
3	P	145	0	141	3	0
3	Q	145	0	141	15	0
3	R	145	0	141	6	0
3	S	145	0	141	10	0
4	H	89	0	0	1	0
4	I	71	0	0	3	0
4	J	81	0	0	6	0
4	K	90	0	0	2	0
4	L	72	0	0	3	0
4	M	63	0	0	4	0
4	N	89	0	0	4	0
4	O	118	0	0	3	0
4	P	6	0	0	0	0
4	Q	7	0	0	2	0
4	R	15	0	0	1	0
4	S	8	0	0	0	0
All	All	14646	0	13590	523	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 19.

The worst 5 of 523 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:K:40:ILE:HD12	2:K:41:PRO:HD2	1.40	1.03
2:J:105:GLN:N	2:J:105:GLN:HE21	1.56	1.02
2:J:105:GLN:H	2:J:105:GLN:NE2	1.59	0.99
1:M:36:TYR:HE1	1:M:89:GLN:HG2	1.30	0.97
2:J:126:PRO:HB3	2:J:138:LEU:HB3	1.45	0.96

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	L	217/219 (99%)	195 (90%)	19 (9%)	3 (1%)	11	20
1	M	217/219 (99%)	202 (93%)	13 (6%)	2 (1%)	17	31
1	N	217/219 (99%)	203 (94%)	10 (5%)	4 (2%)	8	14
1	O	217/219 (99%)	208 (96%)	9 (4%)	0	100	100
2	H	224/226 (99%)	212 (95%)	11 (5%)	1 (0%)	34	54
2	I	224/226 (99%)	212 (95%)	11 (5%)	1 (0%)	34	54
2	J	224/226 (99%)	207 (92%)	12 (5%)	5 (2%)	6	10
2	K	222/226 (98%)	207 (93%)	12 (5%)	3 (1%)	11	20
3	P	18/20 (90%)	15 (83%)	2 (11%)	1 (6%)	2	1
3	Q	18/20 (90%)	16 (89%)	2 (11%)	0	100	100
3	R	18/20 (90%)	16 (89%)	2 (11%)	0	100	100
3	S	18/20 (90%)	17 (94%)	1 (6%)	0	100	100
All	All	1834/1860 (99%)	1710 (93%)	104 (6%)	20 (1%)	14	26

5 of 20 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	H	214	LYS
1	M	155	ASP
1	N	191	SER
1	N	192	HIS
1	L	159	VAL

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	L	186/186 (100%)	178 (96%)	8 (4%)	29	53
1	M	186/186 (100%)	180 (97%)	6 (3%)	39	65
1	N	186/186 (100%)	176 (95%)	10 (5%)	22	42
1	O	186/186 (100%)	179 (96%)	7 (4%)	33	58
2	H	194/194 (100%)	186 (96%)	8 (4%)	30	55
2	I	194/194 (100%)	179 (92%)	15 (8%)	13	25
2	J	194/194 (100%)	186 (96%)	8 (4%)	30	55
2	K	192/194 (99%)	179 (93%)	13 (7%)	16	30
3	P	14/14 (100%)	14 (100%)	0	100	100
3	Q	14/14 (100%)	14 (100%)	0	100	100
3	R	14/14 (100%)	13 (93%)	1 (7%)	14	28
3	S	14/14 (100%)	12 (86%)	2 (14%)	3	6
All	All	1574/1576 (100%)	1496 (95%)	78 (5%)	24	46

5 of 78 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	I	197	ASN
1	N	184	LEU
2	K	149	PRO
2	I	212	GLU
1	N	106(A)	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 33 such sidechains are listed below:

Mol	Chain	Res	Type
2	I	66	GLN
1	N	79	GLN
2	K	164	HIS
2	I	83	GLN
2	I	192	GLN

5.3.3   RNA (i)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

5.6 Ligand geometry ⓘ

There are no ligands in this entry.

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Fit of model and data (i)

6.1 Protein, DNA and RNA chains (i)

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, 95th 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^2)	Q<0.9
1	L	219/219 (100%)	0.50	17 (7%)	13	13	11, 35, 60, 68	0
1	M	219/219 (100%)	0.36	15 (6%)	17	17	11, 31, 58, 67	0
1	N	219/219 (100%)	0.12	4 (1%)	68	71	7, 26, 52, 62	0
1	O	219/219 (100%)	0.10	8 (3%)	41	45	7, 25, 53, 64	0
2	H	226/226 (100%)	0.02	7 (3%)	49	52	9, 22, 46, 66	0
2	I	226/226 (100%)	-0.02	6 (2%)	54	58	12, 23, 42, 59	0
2	J	226/226 (100%)	0.23	13 (5%)	23	24	10, 24, 64, 82	0
2	K	224/226 (99%)	0.14	11 (4%)	29	31	8, 24, 58, 74	0
3	P	20/20 (100%)	0.87	3 (15%)	2	2	20, 34, 50, 56	0
3	Q	20/20 (100%)	0.83	4 (20%)	1	0	16, 36, 53, 53	0
3	R	20/20 (100%)	0.49	3 (15%)	2	2	14, 24, 45, 45	0
3	S	20/20 (100%)	0.24	1 (5%)	28	30	12, 23, 43, 46	0
All	All	1858/1860 (99%)	0.20	92 (4%)	28	30	7, 26, 56, 82	0

The worst 5 of 92 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	J	215	SER	9.8
1	L	95(B)	VAL	7.8
1	L	95(C)	SER	7.1
2	H	215	SER	6.6
2	K	131	THR	6.5

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

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.