



wwPDB X-ray Structure Validation Summary Report i

Feb 27, 2014 – 06:27 PM GMT

PDB ID : 1PYW
Title : Human class II MHC protein HLA-DR1 bound to a designed peptide related to influenza virus hemagglutinin, FVKQNA(MAA)AL, in complex with staphylococcal enterotoxin C3 variant 3B2 (SEC3-3B2)
Authors : Zavala-Ruiz, Z.; Sundberg, E.J.; Stone, J.D.; DeOliveira, D.B.; Chan, I.C.; Svendsen, J.; Mariuzza, R.A.; Stern, L.J.
Deposited on : 2003-07-09
Resolution : 2.10 Å(reported)

This is a wwPDB validation summary report for a publicly released PDB entry.
We welcome your comments at validation@mail.wwpdb.org
A user guide is available at <http://wwpdb.org/ValidationPDFNotes.html>

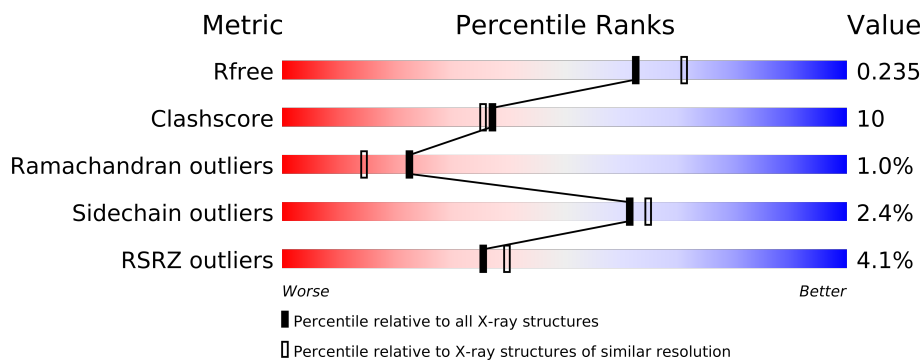
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity	:	4.02b-467
Mogul	:	1.15 2013
Xtriage (Phenix)	:	dev-1323
EDS	:	stable22639
Percentile statistics	:	21963
Refmac	:	5.8.0049
CCP4	:	6.3.0 (Settle)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP)	:	stable22683

1 Overall quality at a glance

The reported resolution of this entry is 2.10 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}	66092	3012 (2.10-2.10)
Clashscore	79885	3649 (2.10-2.10)
Ramachandran outliers	78287	3610 (2.10-2.10)
Sidechain outliers	78261	3611 (2.10-2.10)
RSRZ outliers	66119	3013 (2.10-2.10)

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. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Mol	Chain	Length	Quality of chain
1	A	182	
2	B	190	
3	C	10	
4	D	239	

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 5396 atoms, of which 0 are hydrogen and 0 are deuterium.

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 HLA class II histocompatibility antigen, DR alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	179	Total	C	N	O	S	0	0	0
			1470	952	239	274	5			

- Molecule 2 is a protein called HLA class II histocompatibility antigen, DR-1 beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	190	Total	C	N	O	S	37	0	0
			1557	979	279	293	6			

- Molecule 3 is a protein called 9-residue influenza virus hemagglutinin related peptide FVKQNA(MAA)AI

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	C	10	Total	C	N	O	0	0	0
			71	47	12	12			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	1	PHE	TYR	ENGINEERED	GB 3212739
C	6	ALA	THR	ENGINEERED	GB 3212739
C	7	MAA	LEU	ENGINEERED	GB 3212739
C	8	ALA	LYS	ENGINEERED	GB 3212739

- Molecule 4 is a protein called Enterotoxin type C-3.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	D	230	Total	C	N	O	S	18	0	0
			1884	1196	306	372	10			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	43	SER	LYS	ENGINEERED	UNP P23313
D	45	PHE	LEU	ENGINEERED	UNP P23313
D	46	LYS	ALA	ENGINEERED	UNP P23313
D	47	TRP	HIS	ENGINEERED	UNP P23313

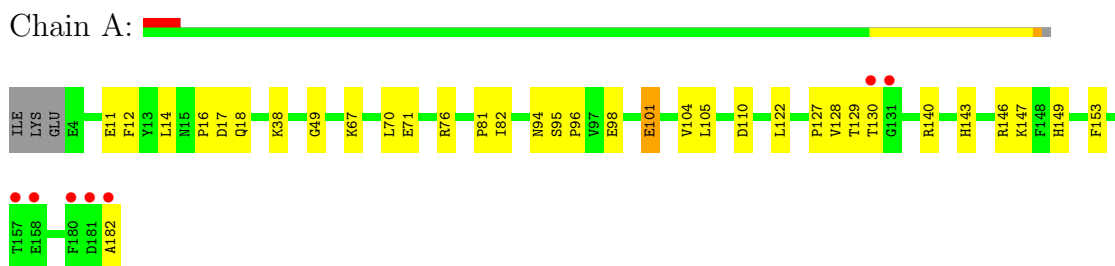
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	135	Total 135	O 135	0	0
5	B	113	Total 113	O 113	0	0
5	C	12	Total 12	O 12	0	0
5	D	154	Total 154	O 154	0	0

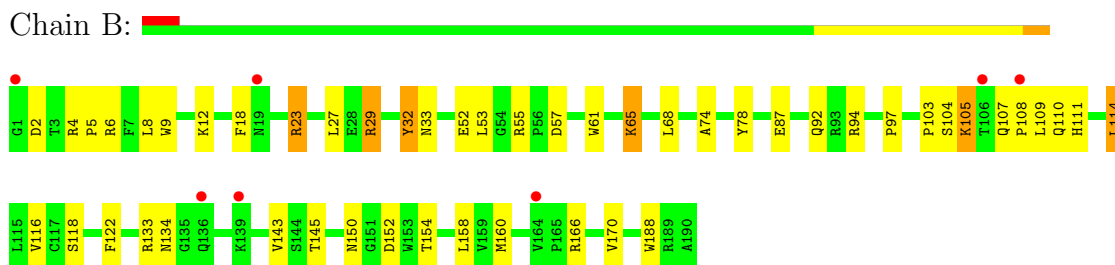
3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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: HLA class II histocompatibility antigen, DR alpha chain



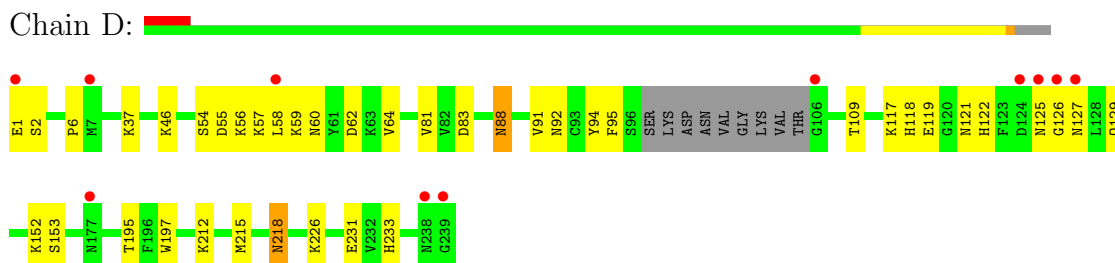
- Molecule 2: HLA class II histocompatibility antigen, DR-1 beta chain



- Molecule 3: 9-residue influenza virus hemagglutinin related peptide FVKQNA(MAA)AL



- Molecule 4: Enterotoxin type C-3



4 Data and refinement statistics

Property	Value	Source
Space group	H 3	Depositor
Cell constants a, b, c, α , β , γ	172.51Å 172.51Å 121.65Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	20.00 – 2.10 21.31 – 2.08	Depositor EDS
% Data completeness (in resolution range)	98.3 (20.00-2.10) 97.4 (21.31-2.08)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	0.07	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.35 (at 2.08Å)	Xtriage
Refinement program	CNS 1.0	Depositor
R, R_{free}	0.209 , 0.235 0.208 , 0.235	Depositor DCC
R_{free} test set	7813 reflections (10.10%)	DCC
Wilson B-factor (Å ²)	27.0	Xtriage
Anisotropy	0.108	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 41.1	EDS
Estimated twinning fraction	0.018 for h,-h-k,-l	Xtriage
L-test for twinning	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Outliers	0 of 78492 reflections	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	5396	wwPDB-VP
Average B, all atoms (Å ²)	32.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.36% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

5 Model quality

5.1 Standard geometry

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

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	0.36	0/1515	0.63	0/2065
2	B	0.36	0/1597	0.63	0/2168
3	C	0.49	0/62	0.84	0/81
4	D	0.35	0/1926	0.59	0/2592
All	All	0.36	0/5100	0.62	0/6906

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Close contacts

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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1470	0	1406	26	0
2	B	1557	0	1488	49	0
3	C	71	0	76	2	0
4	D	1884	0	1811	32	0
5	A	135	0	0	3	0
5	B	113	0	0	0	0
5	C	12	0	0	0	0
5	D	154	0	0	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	5396	0	4781	97	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 10.

The worst 5 of 97 close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
2:B:150:ASN:HD22	2:B:154:THR:HG22	1.19	1.05
2:B:105:LYS:HE3	2:B:105:LYS:H	1.12	1.04
4:D:117:LYS:HE2	4:D:119:GLU:HB3	1.53	0.89
2:B:65:LYS:HE3	2:B:65:LYS:H	1.36	0.87
2:B:105:LYS:CE	2:B:105:LYS:H	1.92	0.83

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone ⓘ

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	177/182 (97%)	173 (98%)	4 (2%)	0	100	100
2	B	188/190 (99%)	178 (95%)	6 (3%)	4 (2%)	11	4
3	C	7/10 (70%)	7 (100%)	0	0	100	100
4	D	226/239 (95%)	217 (96%)	7 (3%)	2 (1%)	25	17
All	All	598/621 (96%)	575 (96%)	17 (3%)	6 (1%)	22	14

5 of 6 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	108	PRO
2	B	110	GLN
2	B	111	HIS
2	B	32	TYR
4	D	57	LYS

5.3.2 Protein sidechains ⓘ

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	163/166 (98%)	161 (99%)	2 (1%)	82	87
2	B	171/171 (100%)	163 (95%)	8 (5%)	36	33
3	C	6/6 (100%)	6 (100%)	0	100	100
4	D	212/220 (96%)	209 (99%)	3 (1%)	78	83
All	All	552/563 (98%)	539 (98%)	13 (2%)	61	65

5 of 13 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	65	LYS
2	B	68	LEU
4	D	56	LYS
2	B	53	LEU
2	B	114	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 20 such sidechains are listed below:

Mol	Chain	Res	Type
4	D	60	ASN
4	D	88	ASN
4	D	157	GLN
2	B	150	ASN
2	B	156	GLN

5.3.3 RNA ⓘ

There are no RNA chains in this entry.

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

1 non-standard protein/DNA/RNA residue is 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	$\# Z > 2$
3	MAA	C	7	3	5,5,6	8.25	3 (60%)	3,5,7	3.00	2 (66%)

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
3	MAA	C	7	3	-	1/2/4/6	0/0/0/0

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	7	MAA	O-C	17.92	1.23	1.11
3	C	7	MAA	CM-N	-3.32	1.36	1.46
3	C	7	MAA	CA-C	2.63	1.53	1.48

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	7	MAA	CM-N-CA	3.81	120.27	113.53
3	C	7	MAA	CB-CA-C	3.38	109.97	108.46

There are no chirality outliers.

All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	C	7	MAA	C-CA-N-CM

There are no ring outliers.

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 ⓘ

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, 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	A	179/182 (98%)	-0.13	7 (3%) 37 42	15, 26, 61, 84	0
2	B	186/190 (97%)	0.00	7 (3%) 38 43	14, 30, 55, 79	0
3	C	10/10 (100%)	-0.69	0 100 100	18, 21, 24, 37	0
4	D	228/239 (95%)	-0.11	11 (4%) 29 32	17, 28, 53, 70	0
All	All	603/621 (97%)	-0.09	25 (4%) 35 40	14, 28, 57, 84	0

The worst 5 of 25 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	182	ALA	8.9
4	D	125	ASN	4.7
1	A	181	ASP	4.7
2	B	1	GLY	4.3
4	D	58	LEU	4.3

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

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 0.9’ lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSR	LLDF	B-factors(Å ²)	Q<0.9
3	MAA	C	7	6/7	0.09	-0.51	17,19,19,20	0

6.3 Carbohydrates ⓘ

There are no carbohydrates in this entry.

6.4 Ligands ⓘ

There are no ligands in this entry.

6.5 Other polymers ⓘ

There are no such residues in this entry.