



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 5, 2026 – 03:58 PM UTC

PDB ID : 8TBP / pdb_00008tbp
Title : HLA-DRB1*15:01 in complex with smith antigen
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Deposited on : 2023-06-29
Resolution : 3.13 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 : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

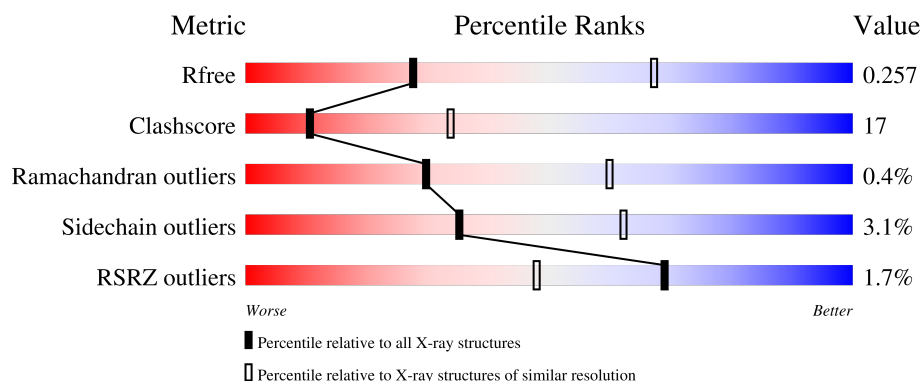
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.13 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}	180053	1816 (3.14-3.10)
Clashscore	190562	1906 (3.14-3.10)
Ramachandran outliers	187476	1802 (3.14-3.10)
Sidechain outliers	187428	1802 (3.14-3.10)
RSRZ outliers	180081	1816 (3.14-3.10)

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 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 $\leq 5\%$. 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	182	 72% 25% ..
1	C	182	 68% 29% ..
2	B	190	 59% 37% ..
2	D	190	 58% 41% .
3	E	15	 60% 33% 7%

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Mol	Chain	Length	Quality of chain
3	F	15	27% 40% 33% 20% 7%

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 6281 atoms, of which 28 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 HLA class II histocompatibility antigen, DR alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	178	Total	C	N	O	S	0	0	0
			1456	943	236	272	5			
1	C	178	Total	C	N	O	S	0	0	0
			1458	946	235	272	5			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	182	THR	ALA	conflict	UNP P01903
C	182	THR	ALA	conflict	UNP P01903

- Molecule 2 is a protein called HLA class II histocompatibility antigen, DRB1 beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	189	Total	C	N	O	S	1	0	0
			1550	978	275	291	6			
2	D	189	Total	C	N	O	S	1	0	0
			1554	981	276	291	6			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	86	GLY	VAL	variant	UNP P01911
D	86	GLY	VAL	variant	UNP P01911

- Molecule 3 is a protein called Small nuclear ribonucleoprotein-associated protein N peptide.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	E	14	Total	C	N	O	0	0	0
			103	67	18	18			
3	F	14	Total	C	N	O	0	0	0
			103	67	18	18			

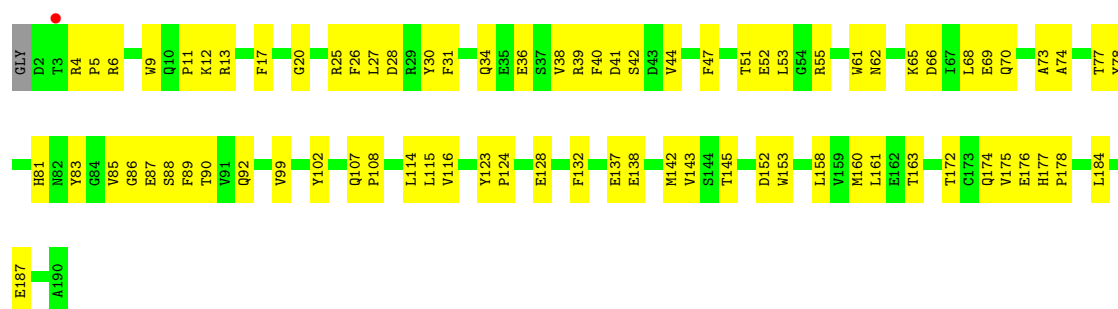
- Molecule 4 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: $C_8H_{15}NO_6$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	H	N	O	0	0
			28	8	14	1	5		
4	C	1	Total	C	H	N	O	0	0
			28	8	14	1	5		

- Molecule 5 is water.

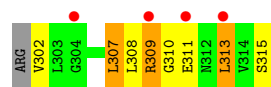
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total	O	0	0
			1	1		



- Molecule 3: Small nuclear ribonucleoprotein-associated protein N peptide



- Molecule 3: Small nuclear ribonucleoprotein-associated protein N peptide



4 Data and refinement statistics

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α , β , γ	95.08Å 95.08Å 294.20Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	46.93 – 3.13 46.93 – 3.13	Depositor EDS
% Data completeness (in resolution range)	99.6 (46.93-3.13) 93.0 (46.93-3.13)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	0.82 (at 3.12Å)	Xtriage
Refinement program	PHENIX 1.10.1_2155	Depositor
R, R_{free}	0.203 , 0.253 0.206 , 0.257	Depositor DCC
R_{free} test set	1222 reflections (4.88%)	wwPDB-VP
Wilson B-factor (Å ²)	58.8	Xtriage
Anisotropy	0.656	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 34.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	6281	wwPDB-VP
Average B, all atoms (Å ²)	55.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.74% 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	0.19	0/1501	0.42	0/2050
1	C	0.17	0/1503	0.41	0/2051
2	B	0.18	0/1593	0.41	0/2165
2	D	0.17	0/1597	0.40	0/2169
3	E	0.19	0/102	0.39	0/137
3	F	0.49	0/102	0.46	0/137
All	All	0.19	0/6398	0.41	0/8709

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	1456	0	1378	40	0
1	C	1458	0	1389	47	0
2	B	1550	0	1461	69	0
2	D	1554	0	1472	67	0
3	E	103	0	117	7	0
3	F	103	0	117	8	0
4	A	14	14	13	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	C	14	14	13	5	0
5	A	1	0	0	0	0
All	All	6253	28	5960	205	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 17.

The worst 5 of 205 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:11:PRO:HB2	2:B:13:ARG:HH22	1.26	0.98
2:B:46:GLU:OE2	2:B:48:ARG:NH2	2.08	0.87
1:C:110:ASP:OD2	1:C:111:LYS:HG3	1.76	0.86
1:C:100:ARG:HA	1:C:154:LEU:HD11	1.60	0.81
1:C:11:GLU:HG3	2:D:11:PRO:HG2	1.62	0.80

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	176/182 (97%)	164 (93%)	12 (7%)	0	100	100
1	C	176/182 (97%)	166 (94%)	9 (5%)	1 (1%)	21	50
2	B	187/190 (98%)	169 (90%)	17 (9%)	1 (0%)	24	55
2	D	187/190 (98%)	174 (93%)	12 (6%)	1 (0%)	24	55
3	E	12/15 (80%)	12 (100%)	0	0	100	100
3	F	12/15 (80%)	11 (92%)	1 (8%)	0	100	100
All	All	750/774 (97%)	696 (93%)	51 (7%)	3 (0%)	30	60

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	143	HIS
2	B	33	ASN
2	D	52	GLU

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	161/167 (96%)	160 (99%)	1 (1%)	78	81
1	C	162/167 (97%)	158 (98%)	4 (2%)	42	66
2	B	169/170 (99%)	161 (95%)	8 (5%)	23	52
2	D	170/170 (100%)	169 (99%)	1 (1%)	78	81
3	E	12/13 (92%)	12 (100%)	0	100	100
3	F	12/13 (92%)	5 (42%)	7 (58%)	0	0
All	All	686/700 (98%)	665 (97%)	21 (3%)	35	62

5 of 21 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	F	302	VAL
3	F	309	ARG
3	F	315	SER
3	F	311	GLU
3	F	308	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	57	GLN
2	B	107	GLN
1	C	84	ASN
1	C	143	HIS

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Mol	Chain	Res	Type
2	D	174	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

2 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	$\# Z > 2$
4	NAG	A	201	1	14,14,15	0.30	0	17,19,21	1.59	1 (5%)
4	NAG	C	201	1	14,14,15	0.62	1 (7%)	17,19,21	1.57	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
4	NAG	A	201	1	-	4/6/23/26	0/1/1/1
4	NAG	C	201	1	-	5/6/23/26	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	201	NAG	C1-C2	2.16	1.55	1.52

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	201	NAG	C1-O5-C5	5.75	119.89	112.19
4	C	201	NAG	C2-N2-C7	4.61	129.07	122.90
4	C	201	NAG	C1-O5-C5	3.69	117.13	112.19

There are no chirality outliers.

5 of 9 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	201	NAG	O5-C5-C6-O6
4	A	201	NAG	C8-C7-N2-C2
4	A	201	NAG	O7-C7-N2-C2
4	C	201	NAG	C8-C7-N2-C2
4	C	201	NAG	O7-C7-N2-C2

There are no ring outliers.

1 monomer is involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	C	201	NAG	5	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 [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	A	178/182 (97%)	-0.31	0 100 100	36, 47, 66, 79	0
1	C	178/182 (97%)	-0.02	1 (0%) 85 70	41, 56, 80, 88	0
2	B	189/190 (99%)	0.05	6 (3%) 50 30	37, 50, 88, 115	1 (0%)
2	D	189/190 (99%)	-0.16	1 (0%) 87 73	31, 50, 81, 100	1 (0%)
3	E	14/15 (93%)	0.12	1 (7%) 22 11	45, 53, 67, 70	0
3	F	14/15 (93%)	1.47	4 (28%) 1 1	60, 74, 88, 94	0
All	All	762/774 (98%)	-0.08	13 (1%) 69 48	31, 51, 81, 115	2 (0%)

The worst 5 of 13 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	109	LEU	5.6
2	B	106	THR	3.2
2	B	168	GLY	3.0
3	F	309	ARG	2.8
2	B	113	ASN	2.5

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 oligosaccharides in this entry.

6.4 Ligands [i](#)

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. 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	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	NAG	C	201	14/15	0.71	0.15	74,99,114,125	0
4	NAG	A	201	14/15	0.80	0.12	60,92,118,129	0

6.5 Other polymers [i](#)

There are no such residues in this entry.