



wwPDB X-ray Structure Validation Summary Report i

Feb 28, 2014 – 09:49 AM GMT

PDB ID : 1HSA
Title : THE THREE-DIMENSIONAL STRUCTURE OF HLA-B27 AT 2.1
ANGSTROMS RESOLUTION SUGGESTS A GENERAL MECHANISM
FOR TIGHT PEPTIDE BINDING TO MHC
Authors : Madden, D.R.; Gorga, J.C.; Strominger, J.L.; Wiley, D.C.
Deposited on : 1992-08-11
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>

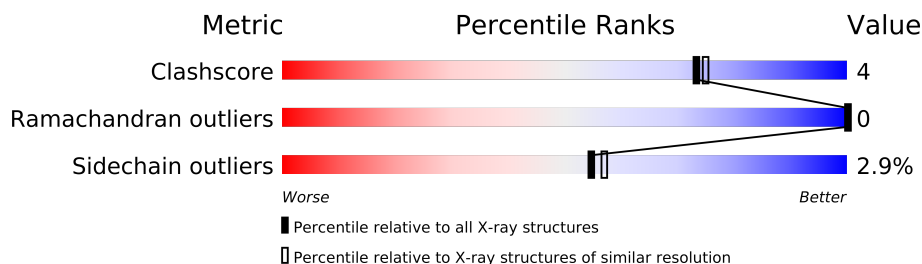
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.15 2013
Xtriage (Phenix) : **NOT EXECUTED**
EDS : **NOT EXECUTED**
Percentile statistics : 21963
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))
Clashscore	79885	3649 (2.10-2.10)
Ramachandran outliers	78287	3610 (2.10-2.10)
Sidechain outliers	78261	3611 (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.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	276	<div><div></div><div></div></div>
1	D	276	<div><div></div><div></div></div>
2	B	99	<div><div></div><div></div></div>
2	E	99	<div><div></div><div></div></div>
3	C	9	<div><div></div><div></div></div>
3	F	9	<div><div></div><div></div></div>

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 6706 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 CLASS I HISTOCOMPATIBILITY ANTIGEN (HLA-B*2705).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	276	Total	C	N	O	S	12	0	0
			2252	1401	408	436	7			
1	D	276	Total	C	N	O	S	12	0	0
			2252	1401	408	436	7			

- Molecule 2 is a protein called BETA 2-MICROGLOBULIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	99	Total	C	N	O	S	5	0	0
			829	528	140	158	3			
2	E	99	Total	C	N	O	S	5	0	0
			829	528	140	158	3			

- Molecule 3 is a protein called MODEL PEPTIDE SEQUENCE - ARAAAAAAA.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	C	9	Total	C	N	O	0	0	0
			52	30	12	10			
3	F	9	Total	C	N	O	0	0	0
			52	30	12	10			

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	149	Total	O	0	0
			149	149		
4	B	60	Total	O	0	0
			60	60		
4	C	4	Total	O	0	0
			4	4		
4	D	147	Total	O	0	0
			147	147		

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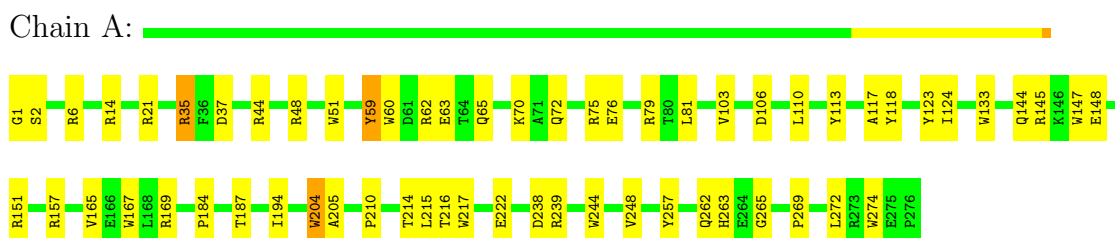
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	E	75	Total 75	O 75	0	0
4	F	5	Total 5	O 5	0	0

3 Residue-property plots

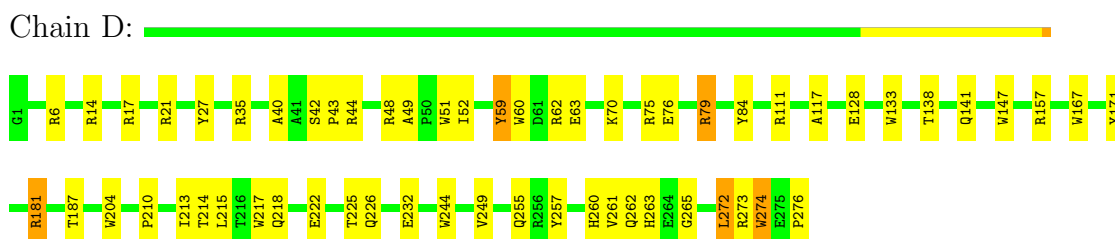
These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according 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.

Note EDS was not executed.

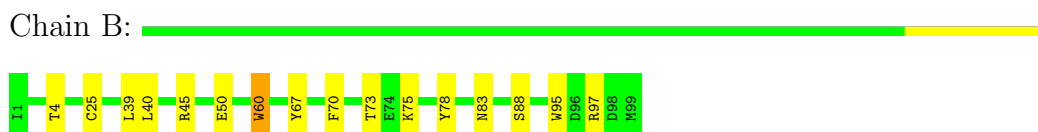
- Molecule 1: CLASS I HISTOCOMPATIBILITY ANTIGEN (HLA-B*2705)



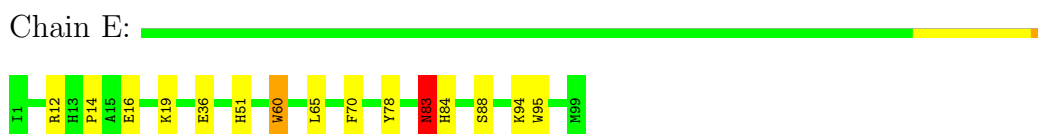
- Molecule 1: CLASS I HISTOCOMPATIBILITY ANTIGEN (HLA-B*2705)



- Molecule 2: BETA 2-MICROGLOBULIN



- Molecule 2: BETA 2-MICROGLOBULIN



- Molecule 3: MODEL PEPTIDE SEQUENCE - ARAAAAAAAA



There are no outlier residues recorded for this chain.

- Molecule 3: MODEL PEPTIDE SEQUENCE - ARAAAAAAAA

Chain F: 

There are no outlier residues recorded for this chain.

4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section will therefore be incomplete.

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	45.10Å 69.80Å 81.10Å 80.30° 88.60° 89.90°	Depositor
Resolution (Å)	(Not available) – 2.10	Depositor
% Data completeness (in resolution range)	(Not available) ((Not available)-2.10)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	X-PLOR	Depositor
R, R_{free}	0.203 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	6706	wwPDB-VP
Average B, all atoms (Å ²)	24.0	wwPDB-VP

5 Model quality

5.1 Standard geometry

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	0.93	0/2314	1.52	55/3147 (1.7%)
1	D	0.94	0/2314	1.55	48/3147 (1.5%)
2	B	0.91	0/852	1.42	12/1152 (1.0%)
2	E	0.91	0/852	1.44	9/1152 (0.8%)
3	C	0.78	0/51	1.04	0/67
3	F	0.87	0/51	1.16	0/67
All	All	0.93	0/6434	1.50	124/8732 (1.4%)

There are no bond length outliers.

The worst 5 of 124 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	48	ARG	NE-CZ-NH1	9.72	125.16	120.30
1	A	151	ARG	NE-CZ-NH2	-9.43	115.59	120.30
1	D	75	ARG	NE-CZ-NH2	-9.37	115.61	120.30
1	D	6	ARG	NE-CZ-NH1	9.36	124.98	120.30
1	A	51	TRP	CD1-CG-CD2	9.21	113.67	106.30

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	2252	0	2109	19	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	D	2252	0	2109	23	0
2	B	829	0	794	5	0
2	E	829	0	794	6	0
3	C	52	0	55	0	0
3	F	52	0	55	0	0
4	A	149	0	0	1	0
4	B	60	0	0	1	0
4	C	4	0	0	0	0
4	D	147	0	0	3	0
4	E	75	0	0	2	0
4	F	5	0	0	0	0
All	All	6706	0	5916	51	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 4.

The worst 5 of 51 close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:D:76:GLU:HG2	1:D:79:ARG:HH21	1.53	0.73
1:D:111:ARG:HD2	4:D:787:HOH:O	1.97	0.65
1:A:144:GLN:O	1:A:148:GLU:HG3	2.00	0.61
1:D:111:ARG:NE	1:D:128:GLU:HG2	2.21	0.56
1:D:274:TRP:O	1:D:276:PRO:HD3	2.06	0.55

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	274/276 (99%)	264 (96%)	10 (4%)	0	100	100
1	D	274/276 (99%)	265 (97%)	9 (3%)	0	100	100
2	B	97/99 (98%)	94 (97%)	3 (3%)	0	100	100
2	E	97/99 (98%)	97 (100%)	0	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
3	C	7/9 (78%)	7 (100%)	0	0	100	100
3	F	7/9 (78%)	7 (100%)	0	0	100	100
All	All	756/768 (98%)	734 (97%)	22 (3%)	0	100	100

There are no Ramachandran outliers to report.

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	235/235 (100%)	231 (98%)	4 (2%)	73	78
1	D	235/235 (100%)	227 (97%)	8 (3%)	49	49
2	B	94/94 (100%)	91 (97%)	3 (3%)	51	52
2	E	94/94 (100%)	90 (96%)	4 (4%)	40	37
3	C	1/1 (100%)	1 (100%)	0	100	100
3	F	1/1 (100%)	1 (100%)	0	100	100
All	All	660/660 (100%)	641 (97%)	19 (3%)	55	57

5 of 19 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	42	SER
1	D	222	GLU
2	E	14	PRO
1	D	35	ARG
2	E	70	PHE

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 9 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	174	ASN
2	E	83	ASN
1	D	197	HIS

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Mol	Chain	Res	Type
2	B	83	ASN
1	D	188	HIS

5.3.3 RNA ⓘ

There are no RNA chains 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 ⓘ

6.1 Protein, DNA and RNA chains ⓘ

EDS was not executed - this section will therefore be empty.

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

EDS was not executed - this section will therefore be empty.

6.3 Carbohydrates ⓘ

EDS was not executed - this section will therefore be empty.

6.4 Ligands ⓘ

EDS was not executed - this section will therefore be empty.

6.5 Other polymers ⓘ

EDS was not executed - this section will therefore be empty.