wwPDB X-ray Structure Validation Summary Report (i)

Oct 16, 2021 – 06:37 PM EDT

PDB ID	:	1R5V
Title	:	Evidence that structural rearrangements and/or flexibility during TCR binding can contribute to T-cell activation
Authors	:	Krogsgaard, M.; Prado, N.; Adams, E.J.; He, X.L.; Chow, D.C.; Wilson, D.B.; Garcia, K.C.; Davis, M.M.
Deposited on	:	2003-10-13
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 (i)) were used in the production of this report:

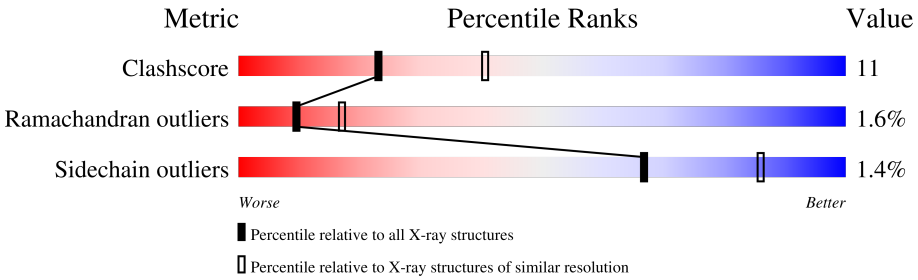
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.23.2

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	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (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 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 <=5%

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	180	80% 19% ··
1	C	180	78% 21% ··
2	E	13	77% 23%
2	F	13	92% 8%
3	B	185	72% 28%
3	D	185	72% 28%

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 6288 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, E-K alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	180	Total	C	N	O	S	0	0	0
			1465	942	240	279	4			
1	C	180	Total	C	N	O	S	0	0	0
			1465	942	240	279	4			

- Molecule 2 is a protein called artificial peptide.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	E	13	Total	C	N	O	0	0	0
			100	67	15	18			
2	F	13	Total	C	N	O	0	0	0
			100	67	15	18			

- Molecule 3 is a protein called MHC H2-IE-beta.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	B	185	Total	C	N	O	S	0	0	0
			1499	950	256	288	5			
3	D	185	Total	C	N	O	S	0	0	0
			1499	950	256	288	5			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	31	ALA	-	cloning artifact	UNP P18468
B	38	SER	CYS	engineered mutation	UNP P18468
D	31	ALA	-	cloning artifact	UNP P18468
D	38	SER	CYS	engineered mutation	UNP P18468

- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	48	Total O 48 48	0	0
4	E	3	Total O 3 3	0	0
4	B	28	Total O 28 28	0	0
4	C	48	Total O 48 48	0	0
4	F	1	Total O 1 1	0	0
4	D	32	Total O 32 32	0	0

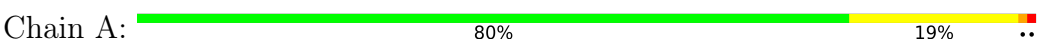
3 Residue-property plots (i)

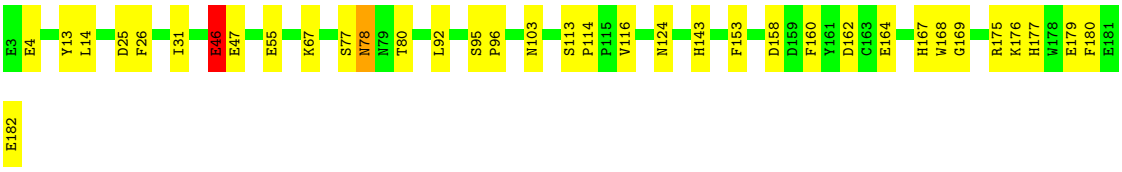
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded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

Note EDS was not executed.

• Molecule 1: H-2 class II histocompatibility antigen, E-K alpha chain

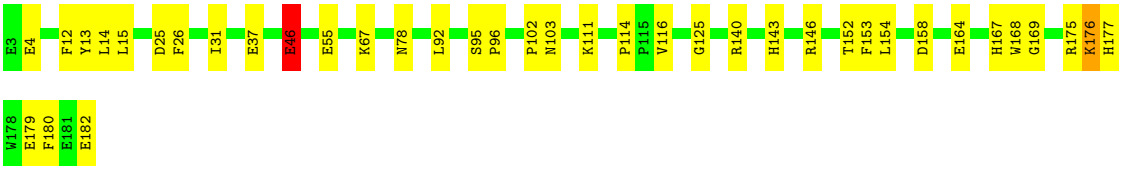
Chain A:





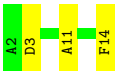
• Molecule 1: H-2 class II histocompatibility antigen, E-K alpha chain

Chain C:



• Molecule 2: artificial peptide

Chain E:

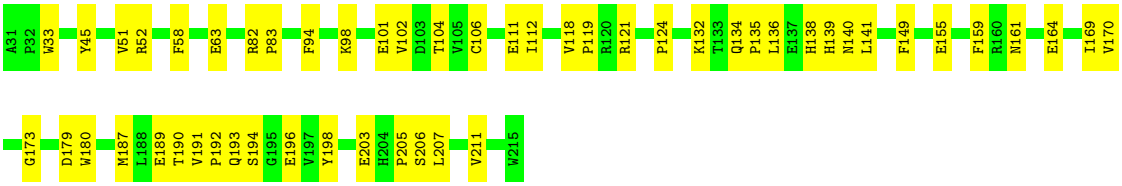


• Molecule 2: artificial peptide

Chain F:

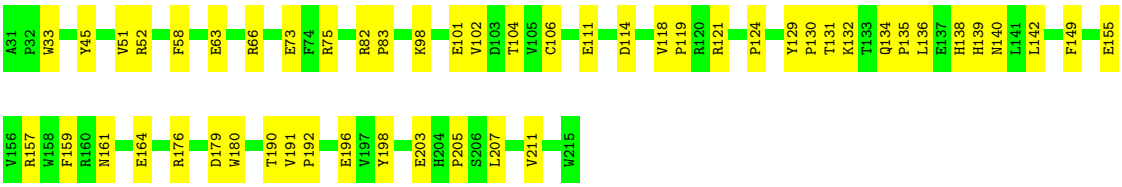
• Molecule 3: MHC H2-IE-beta

Chain B:



• Molecule 3: MHC H2-IE-beta

Chain D:



4 Data and refinement statistics (i)

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

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	79.42Å 104.65Å 120.51Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.00 – 2.50	Depositor
% Data completeness (in resolution range)	(Not available) (50.00-2.50)	Depositor
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	CNS	Depositor
R, R_{free}	0.213 , 0.241	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	6288	wwPDB-VP
Average B, all atoms (Å^2)	40.0	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	0.72	1/1507 (0.1%)	0.75	0/2044
1	C	0.74	1/1507 (0.1%)	0.75	0/2044
2	E	1.33	2/102 (2.0%)	0.85	0/136
2	F	1.28	2/102 (2.0%)	0.87	0/136
3	B	0.64	0/1540	0.73	0/2096
3	D	0.66	0/1540	0.73	0/2096
All	All	0.72	6/6298 (0.1%)	0.74	0/8552

The worst 5 of 6 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	46	GLU	CG-CD	6.55	1.61	1.51
1	C	46	GLU	CG-CD	6.47	1.61	1.51
2	E	14	PHE	CE2-CZ	5.98	1.48	1.37
2	F	14	PHE	CE2-CZ	5.84	1.48	1.37
2	F	14	PHE	CE1-CZ	5.84	1.48	1.37

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-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 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	1465	0	1370	28	0
1	C	1465	0	1370	40	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	E	100	0	103	2	0
2	F	100	0	103	0	0
3	B	1499	0	1390	46	0
3	D	1499	0	1390	38	0
4	A	48	0	0	5	0
4	B	28	0	0	1	0
4	C	48	0	0	4	0
4	D	32	0	0	1	0
4	E	3	0	0	0	0
4	F	1	0	0	0	0
All	All	6288	0	5726	135	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 135 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)
3:D:157:ARG:NH1	4:D:218:HOH:O	2.09	0.85
3:B:190:THR:HG21	3:B:198:TYR:OH	1.84	0.78
3:D:190:THR:HG21	3:D:198:TYR:OH	1.85	0.77
1:A:158:ASP:HB3	4:A:213:HOH:O	1.84	0.77
3:B:82:ARG:HH11	3:B:82:ARG:HG3	1.51	0.76

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	178/180 (99%)	167 (94%)	10 (6%)	1 (1%)	25	43
1	C	178/180 (99%)	168 (94%)	9 (5%)	1 (1%)	25	43

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
2	E	11/13 (85%)	11 (100%)	0	0	100 100
2	F	11/13 (85%)	11 (100%)	0	0	100 100
3	B	183/185 (99%)	167 (91%)	11 (6%)	5 (3%)	5 7
3	D	183/185 (99%)	167 (91%)	11 (6%)	5 (3%)	5 7
All	All	744/756 (98%)	691 (93%)	41 (6%)	12 (2%)	9 17

5 of 12 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	B	134	GLN
3	B	138	HIS
3	B	139	HIS
3	D	134	GLN
3	D	138	HIS

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	158/163 (97%)	155 (98%)	3 (2%)	57 80
1	C	158/163 (97%)	154 (98%)	4 (2%)	47 73
2	E	9/9 (100%)	9 (100%)	0	100 100
2	F	9/9 (100%)	9 (100%)	0	100 100
3	B	164/172 (95%)	163 (99%)	1 (1%)	86 95
3	D	164/172 (95%)	163 (99%)	1 (1%)	86 95
All	All	662/688 (96%)	653 (99%)	9 (1%)	67 86

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

Mol	Chain	Res	Type
1	C	176	LYS
3	D	111	GLU

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Mol	Chain	Res	Type
3	B	111	GLU
1	C	25	ASP
1	C	46	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 7 such sidechains are listed below:

Mol	Chain	Res	Type
3	B	140	ASN
1	C	143	HIS
1	C	177	HIS
1	C	167	HIS
1	A	177	HIS

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)

There are no ligands in this entry.

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

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.