wwPDB X-ray Structure Validation Summary Report (i)

Oct 23, 2024 – 12:27 PM EDT

PDB ID	:	1QRN
Title	:	CRYSTAL STRUCTURE OF HUMAN A6 TCR COMPLEXED WITH HLA-A2 BOUND TO ALTERED HTLV-1 TAX PEPTIDE P6A
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Deposited on	:	1999-06-14
Resolution	:	2.80 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 types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

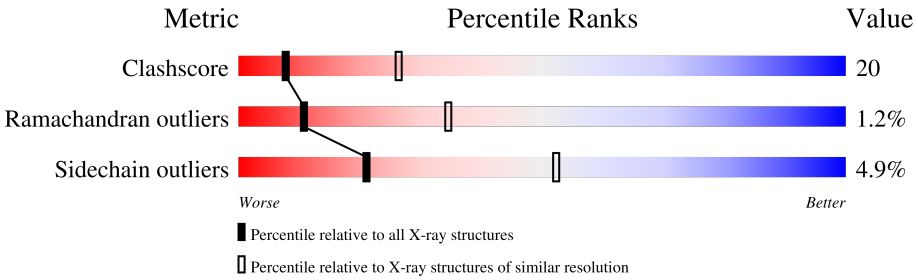
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.39

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 2.80 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	180529	4123 (2.80-2.80)
Ramachandran outliers	177936	4071 (2.80-2.80)
Sidechain outliers	177891	4073 (2.80-2.80)

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	274	68% 31% .
2	B	100	75% 23% .
3	C	9	44% 44% 11%
4	D	200	65% 30% .
5	E	243	58% 37% 5%

2 Entry composition (i)

There are 6 unique types of molecules in this entry. The entry contains 6576 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 HLA CLASS I HISTOCOMPATIBILITY ANTIGEN, A-2 ALPHA CHAIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	274	2238	1398	408	423	9	16	0	0

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	100	837	533	141	159	4	0	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	0	MET	-	cloning artifact	UNP P61769

- Molecule 3 is a protein called TAX PEPTIDE P6A.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	C	9	75	54	9	12	0	0	0

- Molecule 4 is a protein called T-CELL RECEPTOR, ALPHA CHAIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	D	200	1504	943	247	308	6	0	0	0

- Molecule 5 is a protein called T-CELL RECEPTOR, BETA CHAIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
5	E	243	1871	1177	329	357	8	0	0	0

- Molecule 6 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	18	Total O 18 18	0	0
6	B	16	Total O 16 16	0	0
6	C	2	Total O 2 2	0	0
6	D	6	Total O 6 6	0	0
6	E	9	Total O 9 9	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.

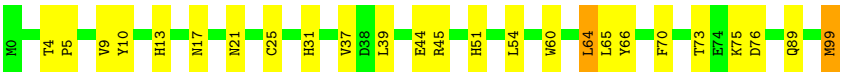
Note EDS was not executed.

• Molecule 1: HLA CLASS I HISTOCOMPATIBILITY ANTIGEN, A-2 ALPHA CHAIN

Chain A:

• Molecule 2: BETA-2 MICROGLOBULIN

Chain B:

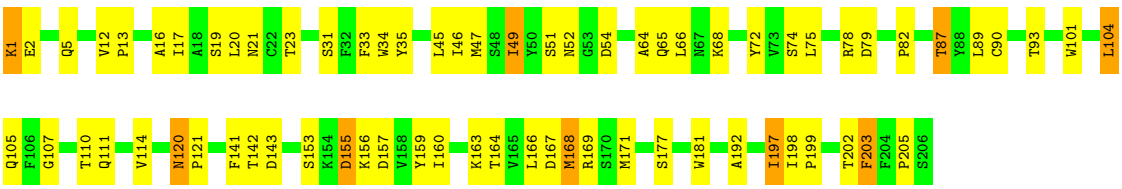


• Molecule 3: TAX PEPTIDE P6A

Chain C:

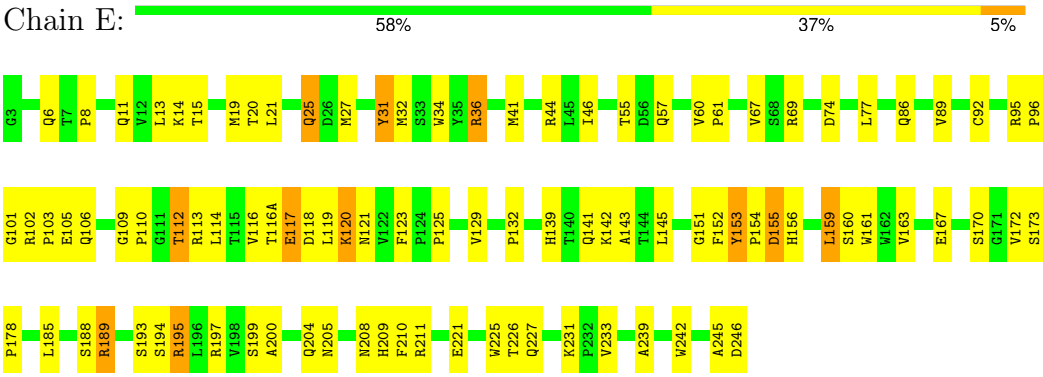
• Molecule 4: T-CELL RECEPTOR, ALPHA CHAIN

Chain D:



• Molecule 5: T-CELL RECEPTOR, BETA CHAIN

Chain E:


58%
37%
5%
G3 Q6 T7 P8 Q11 V12 L13 K14 T15 M19 T20 L21 Q25 D26 M27 Y31 M32 S33 W34 Y35 R36 M41 R44 L45 I46 T55 D56 Q57 V60 P61 V67 S68 R69 D74 L77 Q86 V89 C92 R95 P96 G97 L98 A99 G100
G101 R102 P103 E105 Q106 G109 P110 G111 T112 R113 L114 T115 V116 T116A E117 D118 L119 K120 N121 V122 F123 P124 P125 V129 P132 H139 T140 Q141 K142 A143 T144 L145 G151 F152 Y153 P154 D155 H156 L159 S160 W161 W162 V163 E167 S170 G171 V172 S173 T174 D175 P176 Q177
P178 L185 S188 R189 S193 S194 R195 L196 R197 V198 S199 A200 Q204 N205 N208 H209 F210 R211 E221 W225 T226 Q227 K231 P232 V233 A239 W242 A245 D246

4 Data and refinement statistics (i)

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

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	226.95Å 48.76Å 95.55Å 90.00° 90.79° 90.00°	Depositor
Resolution (Å)	25.00 – 2.80	Depositor
% Data completeness (in resolution range)	(Not available) (25.00-2.80)	Depositor
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	CNS	Depositor
R, R_{free}	0.216 , 0.273	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	6576	wwPDB-VP
Average B, all atoms (Å^2)	50.0	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	0.37	0/2303	0.58	1/3125 (0.0%)
2	B	0.40	0/860	0.65	0/1162
3	C	0.46	0/77	0.77	0/103
4	D	0.35	0/1537	0.58	0/2094
5	E	0.34	0/1924	0.60	0/2628
All	All	0.36	0/6701	0.60	1/9112 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand.A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
3	C	0	1

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	28	VAL	N-CA-C	-5.10	97.24	111.00

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
3	C	5	TYR	Sidechain

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	2238	0	2090	77	0
2	B	837	0	803	20	0
3	C	75	0	77	9	0
4	D	1504	0	1375	58	0
5	E	1871	0	1740	105	0
6	A	18	0	0	0	0
6	B	16	0	0	2	0
6	C	2	0	0	0	0
6	D	6	0	0	1	0
6	E	9	0	0	2	0
All	All	6576	0	6085	246	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 20.

The worst 5 of 246 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)
1:A:45:MET:H	1:A:64:THR:HG22	1.13	1.09
5:E:159:LEU:HD12	5:E:160:SER:N	1.83	0.94
5:E:116(A):THR:HG22	5:E:118:ASP:H	1.33	0.92
1:A:219:ARG:HB2	1:A:222:GLU:HB2	1.55	0.88
1:A:187:THR:HG21	1:A:261:VAL:HG21	1.59	0.84

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	272/274 (99%)	248 (91%)	24 (9%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
2	B	98/100 (98%)	93 (95%)	5 (5%)	0	100 100
3	C	7/9 (78%)	6 (86%)	1 (14%)	0	100 100
4	D	198/200 (99%)	172 (87%)	20 (10%)	6 (3%)	3 13
5	E	241/243 (99%)	218 (90%)	19 (8%)	4 (2%)	7 26
All	All	816/826 (99%)	737 (90%)	69 (8%)	10 (1%)	11 34

5 of 10 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
4	D	156	LYS
5	E	170	SER
4	D	155	ASP
5	E	120	LYS
5	E	153	TYR

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	230/230 (100%)	223 (97%)	7 (3%)	36 70
2	B	95/95 (100%)	90 (95%)	5 (5%)	19 49
3	C	7/7 (100%)	7 (100%)	0	100 100
4	D	161/178 (90%)	151 (94%)	10 (6%)	15 43
5	E	196/208 (94%)	184 (94%)	12 (6%)	15 43
All	All	689/718 (96%)	655 (95%)	34 (5%)	21 52

5 of 34 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
5	E	114	LEU
5	E	117	GLU
5	E	189	ARG
4	D	1	LYS

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Mol	Chain	Res	Type
2	B	99	MET

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 22 such sidechains are listed below:

Mol	Chain	Res	Type
4	D	120	ASN
5	E	6	GLN
4	D	183	ASN
5	E	37	GLN
1	A	174	ASN

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)

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.