



Full wwPDB X-ray Structure Validation Report ⓘ

Apr 25, 2026 – 02:16 PM EDT

PDB ID : 6LIR / pdb_00006lir
Title : crystal structure of chicken TCR for 2.0
Authors : Zhang, L.; Xia, C.
Deposited on : 2019-12-12
Resolution : 2.09 Å(reported)

This is a Full wwPDB X-ray Structure Validation 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
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

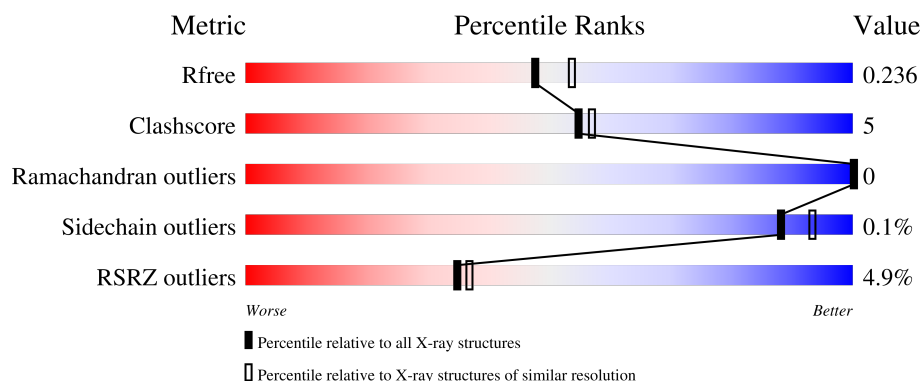
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.09 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	6658 (2.10-2.10)
Clashscore	190562	7164 (2.10-2.10)
Ramachandran outliers	187476	7099 (2.10-2.10)
Sidechain outliers	187428	7100 (2.10-2.10)
RSRZ outliers	180081	6662 (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 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	218	6% 78% 11% 11%
1	C	218	5% 80% 9% 11%
2	B	239	5% 82% 11% 7%
2	D	239	3% 84% 9% 7%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 6796 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 TCR alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	195	Total	C	N	O	S	0	0	0
			1496	931	256	303	6			
1	C	194	Total	C	N	O	S	0	0	0
			1484	922	255	301	6			

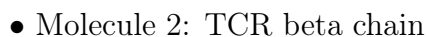
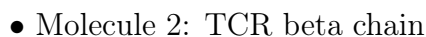
- Molecule 2 is a protein called TCR beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	222	Total	C	N	O	S	0	0	0
			1756	1107	302	342	5			
2	D	222	Total	C	N	O	S	0	0	0
			1760	1109	303	343	5			

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	73	Total	O	0	0
			73	73		
3	B	65	Total	O	0	0
			65	65		
3	C	84	Total	O	0	0
			84	84		
3	D	78	Total	O	0	0
			78	78		

- Molecule 1: TCR alpha chain



TYR
GLN
ARG
SER
ALA
THR
ALA
GLY
LYS

4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	77.43Å 83.10Å 82.42Å 90.00° 117.72° 90.00°	Depositor
Resolution (Å)	38.74 – 2.09 38.74 – 2.09	Depositor EDS
% Data completeness (in resolution range)	98.9 (38.74-2.09) 98.9 (38.74-2.09)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	0.11	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.41 (at 2.10Å)	Xtriage
Refinement program	REFMAC 5.8.0258	Depositor
R, R_{free}	0.205 , 0.236 0.208 , 0.236	Depositor DCC
R_{free} test set	2731 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å ²)	41.5	Xtriage
Anisotropy	0.035	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 36.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.022 for h,-k,-h-l	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	6796	wwPDB-VP
Average B, all atoms (Å ²)	51.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.24% 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](#)

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	0.22	0/1529	0.50	0/2077
1	C	0.18	0/1515	0.45	0/2056
2	B	0.17	0/1792	0.45	0/2420
2	D	0.18	0/1796	0.47	0/2426
All	All	0.19	0/6632	0.47	0/8979

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	1496	0	1452	19	0
1	C	1484	0	1442	15	0
2	B	1756	0	1719	24	0
2	D	1760	0	1724	15	0
3	A	73	0	0	1	1
3	B	65	0	0	5	1
3	C	84	0	0	3	1
3	D	78	0	0	3	1
All	All	6796	0	6337	62	2

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 5.

All (62) 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:58:GLU:OE1	1:A:76:ARG:NH1	1.92	1.02
1:A:104:ARG:NH2	3:A:301:HOH:O	1.92	1.02
1:A:35:GLN:HE22	2:B:34:GLN:HE22	1.27	0.81
1:A:143:LEU:HD23	1:A:149:LYS:HG3	1.71	0.73
2:B:106:ARG:HG2	2:B:150:HIS:CG	2.24	0.73
1:C:12:GLU:OE1	3:C:302:HOH:O	2.08	0.70
1:C:7:SER:OG	3:C:303:HOH:O	2.10	0.69
1:C:76:ARG:HH11	1:C:76:ARG:HG2	1.59	0.68
2:D:162:ARG:NH2	2:D:191:GLU:OE2	2.26	0.66
2:B:222:THR:O	3:B:301:HOH:O	2.13	0.65
2:B:210:THR:OG1	3:B:302:HOH:O	2.15	0.63
2:D:33:LEU:HB2	2:D:43:ILE:HD11	1.81	0.63
2:B:212:GLN:HG2	2:D:214:ILE:HG12	1.80	0.62
2:B:11:LYS:HE3	2:B:14:GLU:OE1	2.02	0.59
2:B:108:THR:OG1	3:B:303:HOH:O	2.16	0.59
2:B:33:LEU:HB2	2:B:43:ILE:HD11	1.83	0.59
1:A:122:SER:O	1:A:126:LYS:HD2	2.03	0.58
1:A:104:ARG:NH1	2:B:170:GLU:OE1	2.35	0.58
1:A:157:ALA:HA	1:A:162:LYS:O	2.05	0.57
2:B:54:LYS:HD3	2:B:58:HIS:CE1	2.40	0.56
1:C:112:THR:N	3:C:301:HOH:O	2.06	0.55
2:D:119:PRO:HG3	2:D:151:LEU:HD11	1.88	0.55
2:D:106:ARG:HG2	2:D:150:HIS:CG	2.42	0.55
1:A:161:ASN:HB2	1:A:164:GLU:HG2	1.89	0.54
2:B:216:LYS:NZ	2:D:210:THR:HG22	2.22	0.54
1:C:157:ALA:HB2	1:C:163:HIS:CE1	2.43	0.54
2:D:135:LYS:O	3:D:302:HOH:O	2.19	0.53
1:C:28:TYR:HB3	1:C:92:SER:O	2.09	0.52
1:C:143:LEU:HB3	1:C:149:LYS:HD2	1.93	0.51
2:B:119:PRO:HG3	2:B:151:LEU:HD11	1.91	0.51
2:B:169:ASP:OD1	2:B:184:ARG:NH2	2.31	0.50
2:D:21:ARG:HG2	2:D:70:VAL:HG22	1.94	0.49
1:C:1:GLN:OE1	2:D:39:GLY:N	2.44	0.49
1:A:152:THR:HG21	2:B:167:GLY:HA3	1.95	0.48
1:C:76:ARG:HG2	1:C:76:ARG:NH1	2.23	0.48
1:A:152:THR:HG21	2:B:167:GLY:CA	2.43	0.48
2:D:79:LYS:HB2	2:D:81:ASN:OD1	2.13	0.48
2:B:188:SER:OG	2:B:190:GLN:HG2	2.14	0.48
2:B:216:LYS:HZ3	2:D:210:THR:HG22	1.79	0.47
2:B:215:GLN:NE2	3:B:313:HOH:O	2.49	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:140:LYS:HD3	1:A:185:GLU:HB3	1.98	0.46
1:A:124:ASP:HB2	2:B:122:VAL:HG12	1.97	0.45
1:A:31:GLN:HG2	1:A:46:SER:HB2	1.97	0.45
2:D:8:LEU:HD23	2:D:107:LEU:HD12	1.97	0.45
2:B:11:LYS:O	2:B:14:GLU:HB2	2.18	0.44
2:D:118:GLU:HG2	3:D:346:HOH:O	2.18	0.44
1:C:158:THR:OG1	1:C:162:LYS:HG2	2.18	0.43
1:C:174:LYS:HD2	1:C:177:GLU:OE2	2.18	0.43
1:A:152:THR:HG22	1:A:153:VAL:H	1.83	0.43
1:A:170:THR:OG1	2:B:184:ARG:NH1	2.51	0.43
1:A:124:ASP:CG	2:B:216:LYS:HE2	2.45	0.42
1:C:12:GLU:HG2	1:C:78:ARG:HH11	1.84	0.42
1:A:194:ASP:HB3	1:A:195:PRO:HD2	2.02	0.41
1:A:143:LEU:HD12	1:A:143:LEU:HA	1.76	0.41
1:C:119:ARG:NE	1:C:129:GLU:OE1	2.53	0.41
2:B:25:ASN:HB3	3:B:308:HOH:O	2.20	0.41
2:D:162:ARG:HD2	2:D:164:GLU:O	2.21	0.41
1:A:34:ARG:HB3	1:A:44:LEU:HD11	2.03	0.40
2:B:82:HIS:HB2	2:B:109:VAL:HG21	2.03	0.40
2:D:59:THR:HA	3:D:301:HOH:O	2.21	0.40
1:C:28:TYR:O	1:C:48:VAL:HG13	2.20	0.40
1:C:92:SER:O	1:C:93:SER:C	2.64	0.40

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:B:358:HOH:O	3:D:355:HOH:O[1_655]	2.03	0.17
3:A:350:HOH:O	3:C:303:HOH:O[1_656]	2.17	0.03

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	193/218 (88%)	193 (100%)	0	0	100	100
1	C	190/218 (87%)	189 (100%)	1 (0%)	0	100	100
2	B	220/239 (92%)	219 (100%)	1 (0%)	0	100	100
2	D	220/239 (92%)	220 (100%)	0	0	100	100
All	All	823/914 (90%)	821 (100%)	2 (0%)	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	167/186 (90%)	167 (100%)	0	100	100
1	C	166/186 (89%)	166 (100%)	0	100	100
2	B	196/210 (93%)	196 (100%)	0	100	100
2	D	197/210 (94%)	196 (100%)	1 (0%)	81	88
All	All	726/792 (92%)	725 (100%)	1 (0%)	88	93

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	D	80	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
2	B	34	GLN
2	B	41	GLN
2	B	58	HIS
2	B	152	ASN
2	B	215	GLN
1	C	163	HIS

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Mol	Chain	Res	Type
2	D	152	ASN
2	D	190	GLN
2	D	208	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

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	195/218 (89%)	0.49	12 (6%) 26 28	30, 46, 90, 147	0
1	C	194/218 (88%)	0.25	11 (5%) 29 31	30, 41, 88, 134	0
2	B	222/239 (92%)	0.44	11 (4%) 34 36	34, 49, 83, 122	0
2	D	222/239 (92%)	0.32	7 (3%) 50 53	34, 47, 72, 110	0
All	All	833/914 (91%)	0.37	41 (4%) 35 37	30, 47, 86, 147	0

All (41) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	93	SER	5.0
1	C	195	PRO	4.5
2	B	97	THR	3.9
1	C	95	THR	3.7
2	D	55	GLY	3.4
1	C	28	TYR	3.4
1	A	193	ASP	3.3
2	D	222	THR	3.1
1	A	128	LEU	3.1
1	C	92	SER	3.0
1	A	143	LEU	2.8
2	B	177	SER	2.8
2	B	110	LEU	2.8
1	A	195	PRO	2.8
1	A	194	ASP	2.7
1	A	94	TYR	2.6
2	B	94	LYS	2.6
1	C	96	LYS	2.6
2	D	96	ASN	2.6
2	D	93	TYR	2.5
2	B	95	GLY	2.5

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Mol	Chain	Res	Type	RSRZ
2	B	96	ASN	2.5
2	B	93	TYR	2.4
1	C	161	ASN	2.4
1	A	176	ASP	2.4
1	C	90	ARG	2.4
2	B	178	THR	2.4
2	B	23	ASN	2.3
2	D	81	ASN	2.3
2	B	47	TYR	2.2
2	D	198	ARG	2.2
1	A	152	THR	2.2
1	C	162	LYS	2.1
1	C	158	THR	2.1
1	A	146	VAL	2.1
1	C	38	GLY	2.1
2	D	37	GLY	2.1
2	B	176	GLY	2.0
1	A	144	SER	2.0
1	A	147	ASP	2.0
1	A	163	HIS	2.0

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](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.