



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 6, 2026 – 10:02 AM UTC

PDB ID : 1SBB / pdb_00001sbb
Title : T-CELL RECEPTOR BETA CHAIN COMPLEXED WITH SUPERANTI-GEN SEB
Authors : Li, H.; Mariuzza, R.A.
Deposited on : 1999-02-22
Resolution : 2.40 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
Xtrriage (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

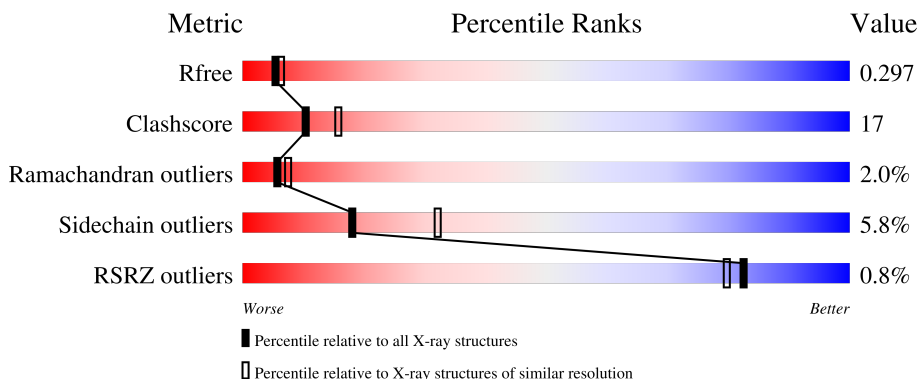
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.40 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	4912 (2.40-2.40)
Clashscore	190562	5391 (2.40-2.40)
Ramachandran outliers	187476	5320 (2.40-2.40)
Sidechain outliers	187428	5321 (2.40-2.40)
RSRZ outliers	180081	4916 (2.40-2.40)

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	238	
1	C	238	
2	B	239	
2	D	239	

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 7748 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 PROTEIN (14.3.D T CELL ANTIGEN RECEPTOR).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	238	1833	1150	328	349	6	164	1	0
1	C	238	1826	1146	325	349	6	139	0	0

There are 14 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	24	GLN	ASN	engineered mutation	GB 1791255
A	74	GLN	ASN	engineered mutation	GB 1791255
A	?	-	GLN	deletion	GB 1791255
A	99	GLY	-	insertion	? ?
A	100	SER	-	insertion	? ?
A	101	TYR	-	insertion	? ?
A	121	GLN	ASN	engineered mutation	GB 1791255
C	24	GLN	ASN	engineered mutation	GB 1791255
C	74	GLN	ASN	engineered mutation	GB 1791255
C	?	-	GLN	deletion	GB 1791255
C	99	GLY	-	insertion	? ?
C	100	SER	-	insertion	? ?
C	101	TYR	-	insertion	? ?
C	121	GLN	ASN	engineered mutation	GB 1791255

- Molecule 2 is a protein called PROTEIN (STAPHYLOCOCCAL ENTEROTOXIN B).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	239	1975	1262	321	382	10	205	0	0
2	D	235	1955	1250	317	378	10	185	0	0

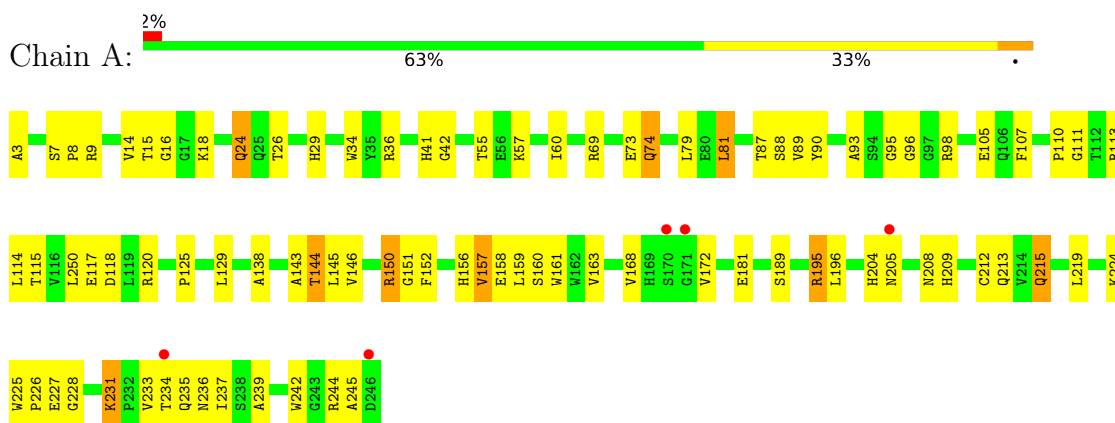
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	54	Total 54	O 54	0	0
3	B	33	Total 33	O 33	0	0
3	C	36	Total 36	O 36	0	0
3	D	36	Total 36	O 36	0	0

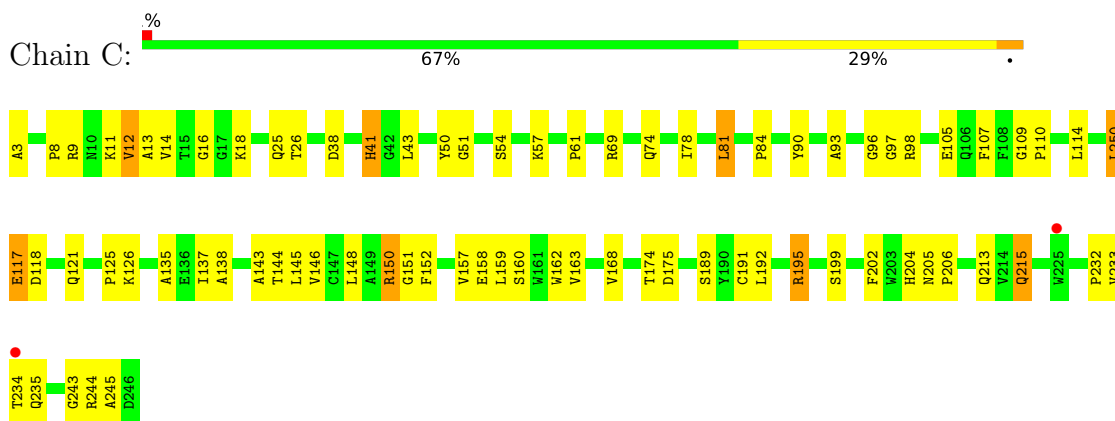
3 Residue-property plots [i](#)

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 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.

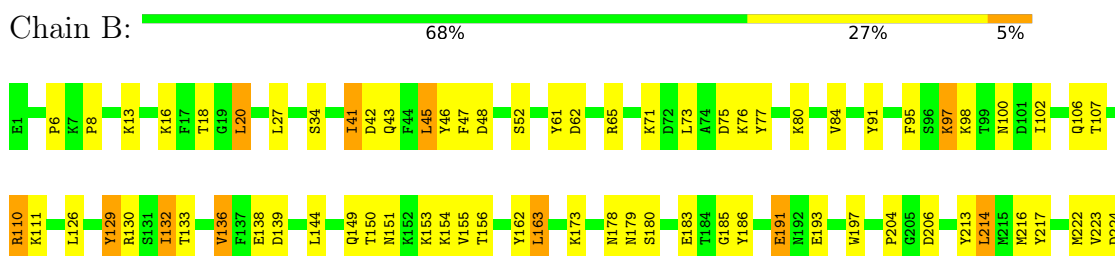
- Molecule 1: PROTEIN (14.3.D T CELL ANTIGEN RECEPTOR)



- Molecule 1: PROTEIN (14.3.D T CELL ANTIGEN RECEPTOR)



- Molecule 2: PROTEIN (STAPHYLOCOCCAL ENTEROTOXIN B)



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	71.20Å 83.65Å 82.98Å 90.00° 93.04° 90.00°	Depositor
Resolution (Å)	6.00 – 2.40 6.00 – 2.40	Depositor EDS
% Data completeness (in resolution range)	90.8 (6.00-2.40) 84.9 (6.00-2.40)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	0.09	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.06 (at 2.31Å)	Xtrriage
Refinement program	X-PLOR 3.1	Depositor
R, R_{free}	0.228 , 0.309 0.223 , 0.297	Depositor DCC
R_{free} test set	3079 reflections (8.07%)	wwPDB-VP
Wilson B-factor (Å ²)	38.2	Xtrriage
Anisotropy	0.192	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 102.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.45$, $\langle L^2 \rangle = 0.27$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	7748	wwPDB-VP
Average B, all atoms (Å ²)	41.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 16.51% 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	0.51	0/1889	0.91	5/2572 (0.2%)
1	C	0.48	0/1878	0.94	7/2558 (0.3%)
2	B	0.50	0/2019	0.88	3/2715 (0.1%)
2	D	0.48	0/1998	0.89	2/2684 (0.1%)
All	All	0.49	0/7784	0.90	17/10529 (0.2%)

There are no bond length outliers.

The worst 5 of 17 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	100	ASN	N-CA-C	9.96	124.29	109.95
2	B	193	GLU	N-CA-C	-8.39	103.56	113.88
2	D	193	GLU	N-CA-C	-7.56	104.29	113.97
1	C	138	ALA	N-CA-C	-6.96	103.36	112.41
1	C	41	HIS	N-CA-C	-6.77	100.77	110.59

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	1833	0	1704	54	0
1	C	1826	0	1695	47	0
2	B	1975	0	1901	60	0
2	D	1955	0	1892	71	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	A	54	0	0	1	0
3	B	33	0	0	0	0
3	C	36	0	0	0	0
3	D	36	0	0	0	0
All	All	7748	0	7192	228	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 228 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:D:190:ILE:HB	2:D:229:LYS:HG3	1.52	0.90
2:B:129:TYR:HD2	2:B:149:GLN:HB3	1.37	0.87
2:D:61:TYR:HA	2:D:110:ARG:HB3	1.56	0.87
1:A:87:THR:HG23	1:A:115:THR:HA	1.60	0.82
1:C:16:GLY:HA2	1:C:81:LEU:HD13	1.63	0.80

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	237/238 (100%)	217 (92%)	16 (7%)	4 (2%)	7 10
1	C	236/238 (99%)	209 (89%)	24 (10%)	3 (1%)	9 14
2	B	237/239 (99%)	206 (87%)	24 (10%)	7 (3%)	3 3
2	D	231/239 (97%)	200 (87%)	26 (11%)	5 (2%)	5 6
All	All	941/954 (99%)	832 (88%)	90 (10%)	19 (2%)	6 7

5 of 19 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	227	GLU
2	B	106	GLN
2	B	110	ARG
2	D	98	LYS
2	D	110	ARG

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	192/202 (95%)	181 (94%)	11 (6%)	18	33
1	C	191/202 (95%)	180 (94%)	11 (6%)	18	32
2	B	217/225 (96%)	204 (94%)	13 (6%)	17	31
2	D	217/225 (96%)	205 (94%)	12 (6%)	19	34
All	All	817/854 (96%)	770 (94%)	47 (6%)	18	32

5 of 47 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	98	ARG
2	D	8	PRO
1	C	250	LEU
1	C	158	GLU
2	D	58	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 14 such sidechains are listed below:

Mol	Chain	Res	Type
2	B	179	ASN
2	B	192	ASN
2	D	179	ASN
2	D	60	ASN
2	D	125	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](#)

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 [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	217/238 (91%)	-0.47	5 (2%) 61 57	8, 30, 77, 103	8 (3%)
1	C	221/238 (92%)	-0.54	2 (0%) 81 78	7, 36, 68, 92	7 (3%)
2	B	218/239 (91%)	-0.54	0 100 100	14, 38, 65, 83	13 (5%)
2	D	215/239 (89%)	-0.51	0 100 100	15, 40, 68, 89	6 (2%)
All	All	871/954 (91%)	-0.52	7 (0%) 82 80	7, 37, 70, 103	34 (3%)

The worst 5 of 7 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	171	GLY	3.6
1	A	246	ASP	3.3
1	C	234	THR	2.7
1	A	234	THR	2.6
1	A	205	ASN	2.2

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.