



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 12, 2024 – 04:43 PM EDT

PDB ID : 1BEC  
Title : BETA CHAIN OF A T CELL ANTIGEN RECEPTOR  
Authors : Bentley, G.A.; Boulot, G.; Karjalainen, K.; Mariuzza, R.A.  
Deposited on : 1995-02-28  
Resolution : 1.70 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](mailto: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>.

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

MolProbity : 4.02b-467  
Xtrriage (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

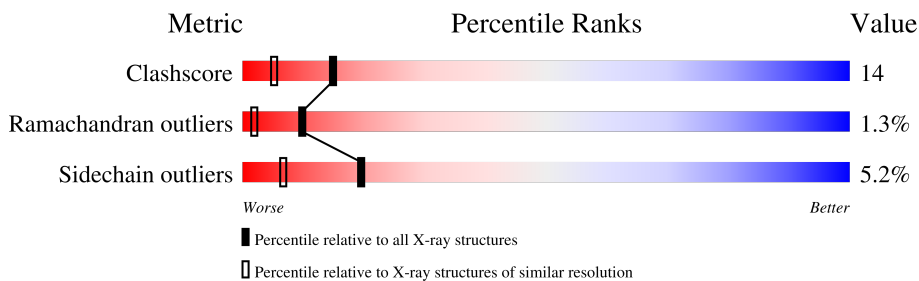
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.70 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	5671 (1.70-1.70)
Ramachandran outliers	177936	5594 (1.70-1.70)
Sidechain outliers	177891	5594 (1.70-1.70)

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  $\geq 3$ , 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  $\leq 5\%$ .

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	238	 69% 25% 5%

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 1935 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 14.3.D T CELL ANTIGEN RECEPTOR.

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

There are 7 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	24	GLN	ASN	conflict	UNP Q8K1Z5
A	74	GLN	ASN	conflict	UNP Q8K1Z5
A	?	-	GLN	deletion	UNP Q8K1Z5
A	99	GLY	-	insertion	UNP Q8K1Z5
A	100	SER	-	insertion	UNP Q8K1Z5
A	101	TYR	-	insertion	UNP Q8K1Z5
A	121	GLN	ASN	conflict	UNP Q8K1Z5

- Molecule 2 is water.

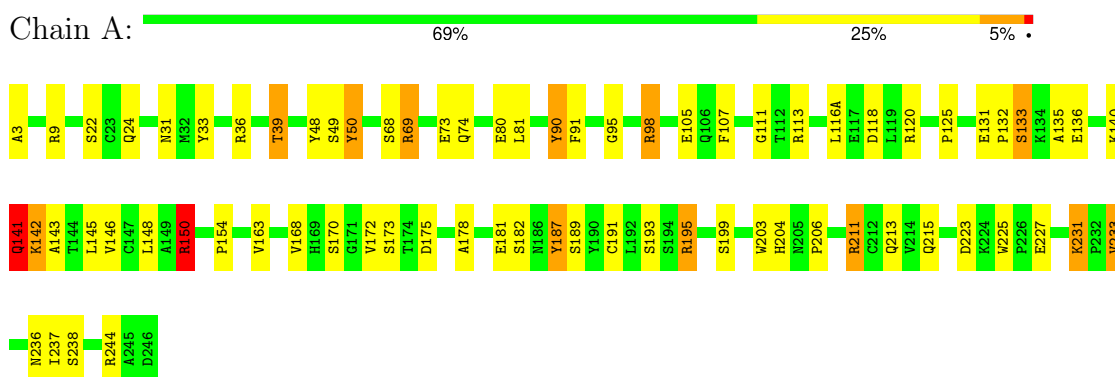
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	109	Total	O	0	0
			109	109		

### 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: 14.3.D T CELL ANTIGEN RECEPTOR



## 4 Data and refinement statistics

Xtrriage (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, $\alpha$ , $\beta$ , $\gamma$	100.60Å 36.60Å 71.50Å 90.00° 113.40° 90.00°	Depositor
Resolution (Å)	7.00 – 1.70	Depositor
% Data completeness (in resolution range)	(Not available) (7.00-1.70)	Depositor
$R_{merge}$	0.05	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	PROLSQ, X-PLOR	Depositor
R, $R_{free}$	0.198 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	1935	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	23.0	wwPDB-VP

## 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	0.75	1/1878 (0.1%)	1.89	53/2558 (2.1%)

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
1	A	0	1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	187	TYR	C-N	5.03	1.45	1.34

All (53) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	98	ARG	CD-NE-CZ	13.98	143.17	123.60
1	A	195	ARG	NE-CZ-NH1	-11.69	114.45	120.30
1	A	150	ARG	NE-CZ-NH1	11.00	125.80	120.30
1	A	150	ARG	CD-NE-CZ	10.86	138.80	123.60
1	A	113	ARG	NE-CZ-NH1	10.06	125.33	120.30
1	A	68	SER	N-CA-CB	8.99	123.98	110.50
1	A	118	ASP	CB-CG-OD1	8.94	126.35	118.30
1	A	120	ARG	NE-CZ-NH2	-8.39	116.10	120.30
1	A	141	GLN	N-CA-C	8.27	133.31	111.00
1	A	211	ARG	NE-CZ-NH2	8.07	124.34	120.30
1	A	168	VAL	CA-CB-CG2	-7.99	98.91	110.90
1	A	95	GLY	O-C-N	7.72	136.32	123.20
1	A	98	ARG	NE-CZ-NH1	7.69	124.15	120.30
1	A	136	GLU	OE1-CD-OE2	-7.57	114.22	123.30
1	A	133	SER	N-CA-CB	7.51	121.77	110.50

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	168	VAL	CG1-CB-CG2	7.38	122.70	110.90
1	A	107	PHE	CB-CG-CD1	-7.29	115.70	120.80
1	A	90	TYR	CB-CG-CD2	-7.21	116.67	121.00
1	A	33	TYR	CB-CG-CD1	7.10	125.26	121.00
1	A	90	TYR	CB-CG-CD1	6.60	124.96	121.00
1	A	98	ARG	NE-CZ-NH2	6.54	123.57	120.30
1	A	98	ARG	NH1-CZ-NH2	-6.47	112.28	119.40
1	A	105	GLU	OE1-CD-OE2	-6.42	115.59	123.30
1	A	178	ALA	N-CA-CB	6.39	119.05	110.10
1	A	33	TYR	CG-CD1-CE1	6.35	126.38	121.30
1	A	69	ARG	CD-NE-CZ	6.33	132.47	123.60
1	A	73	GLU	CB-CA-C	-6.28	97.85	110.40
1	A	223	ASP	CB-CG-OD2	6.20	123.88	118.30
1	A	206	PRO	N-CD-CG	-6.14	94.00	103.20
1	A	141	GLN	N-CA-CB	-6.11	99.60	110.60
1	A	233	VAL	N-CA-CB	-6.04	98.20	111.50
1	A	36	ARG	NE-CZ-NH1	-5.95	117.33	120.30
1	A	95	GLY	CA-C-N	-5.95	104.31	116.20
1	A	36	ARG	NE-CZ-NH2	5.92	123.26	120.30
1	A	187	TYR	CB-CG-CD2	-5.75	117.55	121.00
1	A	22	SER	O-C-N	5.73	131.87	122.70
1	A	9	ARG	NE-CZ-NH2	-5.72	117.44	120.30
1	A	68	SER	O-C-N	5.61	131.68	122.70
1	A	50	TYR	CB-CG-CD2	5.55	124.33	121.00
1	A	195	ARG	NE-CZ-NH2	5.54	123.07	120.30
1	A	211	ARG	NH1-CZ-NH2	-5.52	113.33	119.40
1	A	175	ASP	CB-CG-OD2	-5.47	113.38	118.30
1	A	120	ARG	CA-CB-CG	-5.34	101.66	113.40
1	A	91	PHE	CB-CG-CD1	-5.31	117.08	120.80
1	A	107	PHE	CB-CG-CD2	5.31	124.52	120.80
1	A	172	VAL	CA-CB-CG1	-5.24	103.03	110.90
1	A	73	GLU	OE1-CD-OE2	5.19	129.52	123.30
1	A	170	SER	N-CA-CB	5.18	118.28	110.50
1	A	118	ASP	CB-CG-OD2	-5.14	113.67	118.30
1	A	231	LYS	N-CA-CB	-5.11	101.41	110.60
1	A	3	ALA	CB-CA-C	-5.04	102.53	110.10
1	A	168	VAL	N-CA-CB	-5.03	100.43	111.50
1	A	24	GLN	CB-CG-CD	5.02	124.66	111.60

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	187	TYR	Mainchain

## 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	1826	0	1695	48	0
2	A	109	0	0	2	2
All	All	1935	0	1695	48	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 14.

All (48) 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:204:HIS:HA	1:A:244:ARG:O	1.51	1.08
1:A:141:GLN:CG	1:A:142:LYS:H	1.68	1.06
1:A:141:GLN:HG3	1:A:142:LYS:N	1.73	1.03
1:A:141:GLN:HG3	1:A:142:LYS:H	1.21	1.01
1:A:225:TRP:HB2	1:A:231:LYS:HZ3	1.24	0.98
1:A:204:HIS:CA	1:A:244:ARG:O	2.21	0.88
1:A:140:LYS:O	1:A:141:GLN:HG2	1.76	0.86
1:A:141:GLN:CG	1:A:142:LYS:N	2.31	0.86
1:A:225:TRP:HB2	1:A:231:LYS:NZ	1.90	0.85
1:A:48:TYR:HE2	1:A:50:TYR:CZ	1.93	0.85
1:A:141:GLN:HG3	1:A:143:ALA:H	1.51	0.76
1:A:133:SER:OG	1:A:135:ALA:HB3	1.86	0.75
1:A:80:GLU:O	1:A:81:LEU:HD23	1.88	0.72
1:A:213:GLN:HG2	1:A:236:ASN:HD21	1.54	0.72
1:A:148:LEU:HD12	1:A:193:SER:HB3	1.74	0.68
1:A:225:TRP:CB	1:A:231:LYS:HZ3	2.05	0.67
1:A:141:GLN:HG2	1:A:142:LYS:H	1.61	0.65
1:A:182:SER:OG	1:A:189:SER:HB3	1.97	0.65
1:A:181:GLU:OE1	1:A:191:CYS:HB2	1.96	0.65
1:A:213:GLN:CG	1:A:236:ASN:HD21	2.10	0.63
1:A:142:LYS:O	1:A:143:ALA:HB3	2.01	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:148:LEU:CD1	1:A:193:SER:HB3	2.30	0.60
1:A:150:ARG:NH1	1:A:181:GLU:OE2	2.37	0.57
1:A:48:TYR:HE2	1:A:50:TYR:CE1	2.21	0.57
1:A:141:GLN:O	1:A:142:LYS:CB	2.54	0.55
1:A:132:PRO:HG2	1:A:143:ALA:O	2.07	0.54
1:A:154:PRO:HG2	2:A:291:HOH:O	2.07	0.54
1:A:211:ARG:HH21	1:A:213:GLN:HG3	1.73	0.53
1:A:133:SER:OG	1:A:135:ALA:CB	2.55	0.53
1:A:146:VAL:HG22	1:A:195:ARG:HG2	1.91	0.51
1:A:143:ALA:CB	1:A:195:ARG:HB3	2.41	0.51
1:A:48:TYR:CE2	1:A:50:TYR:CZ	2.86	0.50
1:A:204:HIS:C	1:A:244:ARG:O	2.52	0.47
1:A:145:LEU:HD21	1:A:203:TRP:CH2	2.49	0.46
1:A:150:ARG:HH11	1:A:150:ARG:HB2	1.81	0.46
1:A:80:GLU:HG2	2:A:267:HOH:O	2.16	0.45
1:A:125:PRO:HG2	1:A:237:ILE:HD13	1.99	0.45
1:A:48:TYR:HE2	1:A:50:TYR:OH	1.97	0.45
1:A:146:VAL:HG22	1:A:195:ARG:CG	2.46	0.45
1:A:48:TYR:CE2	1:A:50:TYR:CE1	3.05	0.45
1:A:173:SER:O	1:A:195:ARG:NH2	2.50	0.44
1:A:90:TYR:O	1:A:111:GLY:HA2	2.18	0.44
1:A:142:LYS:O	1:A:143:ALA:CB	2.65	0.44
1:A:148:LEU:HD12	1:A:193:SER:CB	2.47	0.43
1:A:131:GLU:HA	1:A:132:PRO:HD3	1.94	0.41
1:A:211:ARG:HH21	1:A:213:GLN:CG	2.34	0.41
1:A:69:ARG:HD2	1:A:74:GLN:O	2.21	0.41
1:A:31:ASN:HA	1:A:49:SER:O	2.20	0.41

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)
2:A:329:HOH:O	2:A:329:HOH:O[2_656]	1.75	0.45
2:A:282:HOH:O	2:A:331:HOH:O[2_655]	1.96	0.24

## 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	236/238 (99%)	225 (95%)	8 (3%)	3 (1%)	10 2

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	141	GLN
1	A	39	THR
1	A	142	LYS

### 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	191/202 (95%)	181 (95%)	10 (5%)	19 7

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	39	THR
1	A	98	ARG
1	A	116(A)	LEU
1	A	150	ARG
1	A	163	VAL
1	A	199	SER
1	A	215	GLN
1	A	227	GLU

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Mol	Chain	Res	Type
1	A	233	VAL
1	A	238	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	31	ASN
1	A	141	GLN
1	A	236	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 [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

EDS was not executed - this section is therefore empty.

### 6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

EDS was not executed - this section is therefore empty.

### 6.3 Carbohydrates [i](#)

EDS was not executed - this section is therefore empty.

### 6.4 Ligands [i](#)

EDS was not executed - this section is therefore empty.

### 6.5 Other polymers [i](#)

EDS was not executed - this section is therefore empty.