



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 8, 2026 – 03:29 PM UTC

PDB ID : 1JL4 / pdb_00001jl4
Title : CRYSTAL STRUCTURE OF THE HUMAN CD4 N-TERMINAL TWO DOMAIN FRAGMENT COMPLEXED TO A CLASS II MHC MOLECULE
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Deposited on : 2001-07-15
Resolution : 4.30 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
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

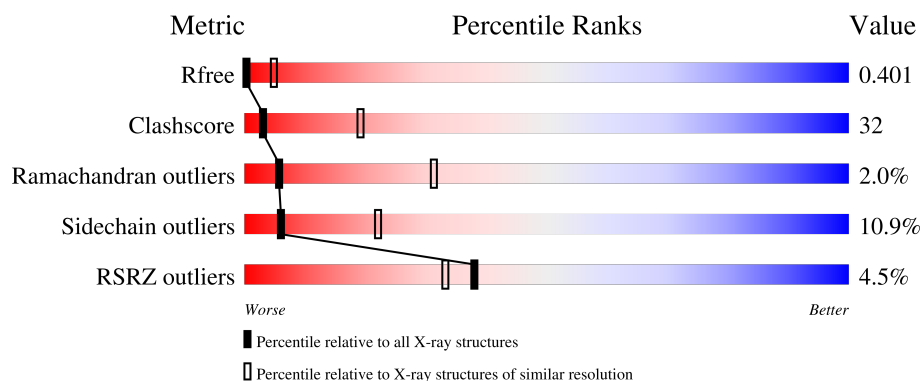
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 4.30 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	1052 (4.70-3.90)
Clashscore	190562	1097 (4.70-3.90)
Ramachandran outliers	187476	1001 (4.70-3.90)
Sidechain outliers	187428	1007 (4.72-3.88)
RSRZ outliers	180081	1049 (4.70-3.90)

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	178	4% 62% 35% .
2	B	185	5% 74% 24% ..
3	C	16	31% 31% 38%
4	D	178	4% 31% 40% 24% 5%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 4474 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, A-K ALPHA CHAIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	178	Total	C	N	O	S	0	0	0
			1447	935	232	277	3			

- Molecule 2 is a protein called H-2 CLASS II HISTOCOMPATIBILITY ANTIGEN, A-K BETA CHAIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	185	Total	C	N	O	S	0	0	0
			1543	972	278	287	6			

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	5	GLY	-	cloning artifact	UNP P06343
B	6	SER	-	cloning artifact	UNP P06343
B	181	THR	LYS	conflict	UNP P06343

- Molecule 3 is a protein called OVOTRANSFERRIN.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	C	16	Total	C	N	O	0	0	0
			120	71	23	26			

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	131	GLY	-	cloning artifact	UNP P02789
C	132	ASN	-	cloning artifact	UNP P02789
C	133	SER	-	cloning artifact	UNP P02789

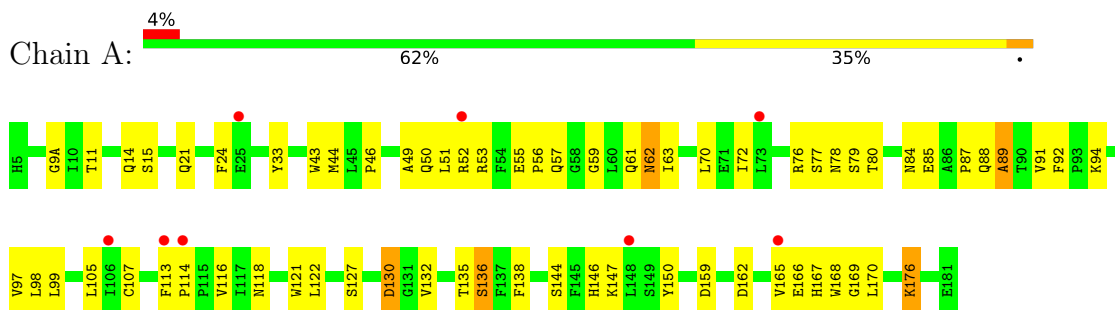
- Molecule 4 is a protein called T-CELL SURFACE GLYCOPROTEIN CD4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	D	178	Total	C	N	O	S	0	0	0
			1364	859	231	270	4			

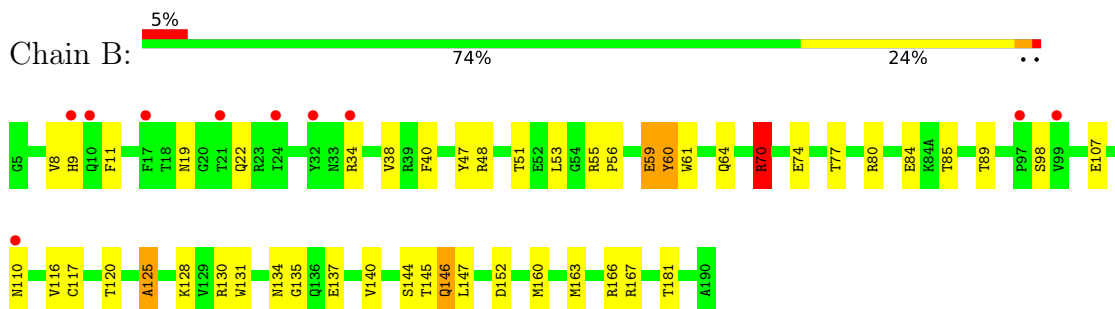
3 Residue-property plots

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.

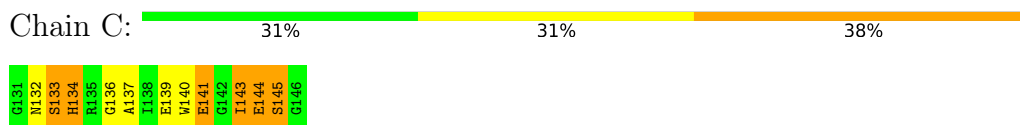
- Molecule 1: H-2 CLASS II HISTOCOMPATIBILITY ANTIGEN, A-K ALPHA CHAIN



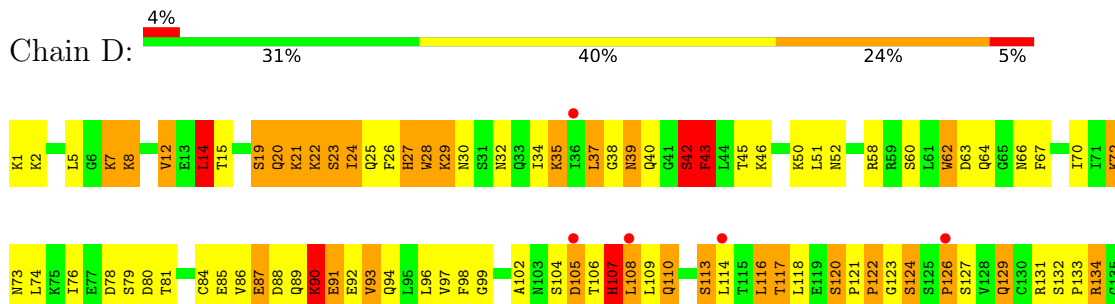
- Molecule 2: H-2 CLASS II HISTOCOMPATIBILITY ANTIGEN, A-K BETA CHAIN



- Molecule 3: OVOTRANSFERRIN



- Molecule 4: T-CELL SURFACE GLYCOPROTEIN CD4





4 Data and refinement statistics

Property	Value	Source
Space group	P 43 2 2	Depositor
Cell constants a, b, c, α , β , γ	145.19Å 145.19Å 103.85Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 4.30 20.00 – 4.30	Depositor EDS
% Data completeness (in resolution range)	81.0 (20.00-4.30) 80.5 (20.00-4.30)	Depositor EDS
R_{merge}	0.15	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.92 (at 4.00Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.420 , 0.453 0.376 , 0.401	Depositor DCC
R_{free} test set	645 reflections (8.68%)	wwPDB-VP
Wilson B-factor (Å ²)	137.3	Xtriage
Anisotropy	0.665	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.25 , 9.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.43$, $\langle L^2 \rangle = 0.26$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.82	EDS
Total number of atoms	4474	wwPDB-VP
Average B, all atoms (Å ²)	64.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.89% 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

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	0.76	2/1492 (0.1%)	1.03	11/2035 (0.5%)
2	B	0.76	3/1582 (0.2%)	1.09	15/2149 (0.7%)
3	C	0.41	0/122	1.02	1/161 (0.6%)
4	D	1.28	6/1379 (0.4%)	1.91	36/1854 (1.9%)
All	All	0.94	11/4575 (0.2%)	1.37	63/6199 (1.0%)

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
4	D	0	1

The worst 5 of 11 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	99	GLY	C-N	20.04	1.66	1.33
1	A	89	ALA	C-N	17.69	1.57	1.33
2	B	89	THR	C-N	-17.52	1.12	1.33
1	A	80	THR	C-N	10.63	1.46	1.33
2	B	80	ARG	C-N	9.01	1.45	1.33

The worst 5 of 63 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	89	THR	CA-C-N	11.47	136.03	120.54
2	B	89	THR	C-N-CA	11.47	136.03	120.54
2	B	89	THR	O-C-N	-10.28	108.92	122.59
4	D	164	ASN	CA-CB-CG	-10.07	102.53	112.60
4	D	153	ASP	CA-CB-CG	-8.55	104.05	112.60

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
4	D	43	PHE	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	1447	0	1376	71	12
2	B	1543	0	1486	69	23
3	C	120	0	102	48	11
4	D	1364	0	1373	174	23
All	All	4474	0	4337	278	55

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 32.

The worst 5 of 278 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:88:GLN:HE22	4:D:60:SER:CB	1.26	1.48
1:A:88:GLN:NE2	4:D:60:SER:HB3	1.40	1.37
1:A:53:ARG:CG	3:C:132:ASN:O	1.73	1.36
1:A:53:ARG:O	3:C:134:HIS:HB2	1.31	1.26
2:B:85:THR:OG1	3:C:134:HIS:HE1	1.30	1.14

The worst 5 of 55 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)
4:D:107:HIS:CD2	4:D:177:LEU:CB[8_665]	0.41	1.79
1:A:57:GLN:CD	1:A:57:GLN:CD[5_555]	0.51	1.69
1:A:57:GLN:CG	1:A:57:GLN:NE2[5_555]	0.91	1.29
2:B:64:GLN:NE2	3:C:144:GLU:CG[5_555]	0.97	1.23
4:D:107:HIS:CG	4:D:177:LEU:CB[8_665]	1.10	1.10

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	176/178 (99%)	168 (96%)	8 (4%)	0	100	100
2	B	183/185 (99%)	175 (96%)	8 (4%)	0	100	100
3	C	14/16 (88%)	12 (86%)	1 (7%)	1 (7%)	1	11
4	D	176/178 (99%)	145 (82%)	21 (12%)	10 (6%)	1	14
All	All	549/557 (99%)	500 (91%)	38 (7%)	11 (2%)	6	31

5 of 11 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
4	D	124	SER
4	D	21	LYS
4	D	126	PRO
4	D	151	LEU
3	C	145	SER

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	162/162 (100%)	157 (97%)	5 (3%)	35	56
2	B	171/171 (100%)	168 (98%)	3 (2%)	51	67
3	C	11/11 (100%)	5 (46%)	6 (54%)	0	0
4	D	159/161 (99%)	118 (74%)	41 (26%)	0	3
All	All	503/505 (100%)	448 (89%)	55 (11%)	6	22

5 of 55 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
4	D	91	GLU
4	D	120	SER
4	D	176	VAL
4	D	165	GLN
4	D	94	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 15 such sidechains are listed below:

Mol	Chain	Res	Type
3	C	134	HIS
4	D	110	GLN
4	D	32	ASN
4	D	148	GLN
4	D	89	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

The following chains have linkage breaks:

Mol	Chain	Number of breaks
2	B	2
4	D	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	D	99:GLY	C	100:LEU	N	1.66
1	B	84:GLU	C	84(A):LYS	N	1.18
1	B	89:THR	C	90:SER	N	1.12

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	178/178 (100%)	0.31	8 (4%) 38 33	52, 52, 57, 57	0
2	B	185/185 (100%)	0.34	10 (5%) 31 29	47, 47, 63, 63	0
3	C	16/16 (100%)	0.45	0 100 100	82, 82, 82, 82	0
4	D	178/178 (100%)	0.29	7 (3%) 43 36	73, 73, 100, 100	0
All	All	557/557 (100%)	0.32	25 (4%) 38 33	47, 57, 100, 100	0

The worst 5 of 25 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	24	ILE	4.7
1	A	114	PRO	3.9
1	A	25	GLU	3.6
1	A	165	VAL	3.5
2	B	10	GLN	3.4

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.