



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 18, 2026 – 06:29 AM UTC

PDB ID : 4CRU / pdb_00004cru
Title : Complex of human CNOT9 and CNOT1 including one tryptophan
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Deposited on : 2014-03-01
Resolution : 1.65 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
Mogul : 2022.3.0, CSD as543be (2022)
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

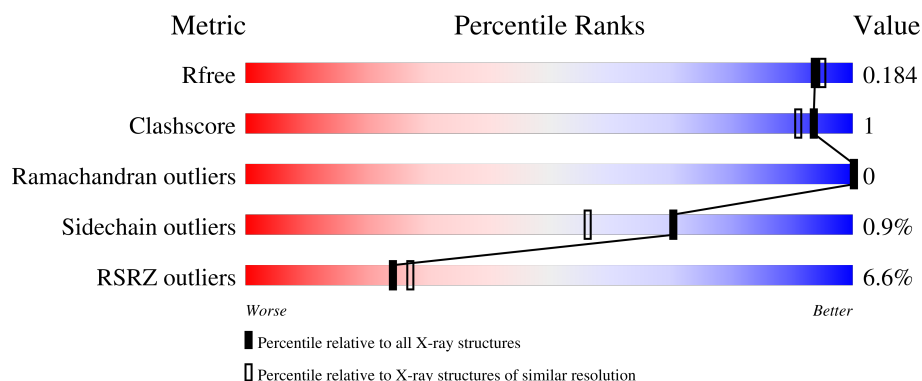
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

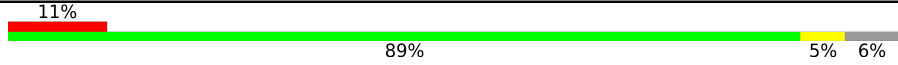
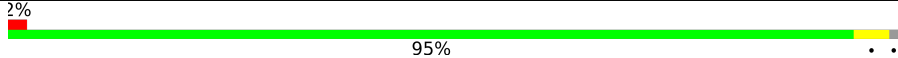
The reported resolution of this entry is 1.65 Å.

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	2563 (1.66-1.66)
Clashscore	190562	2662 (1.66-1.66)
Ramachandran outliers	187476	2621 (1.66-1.66)
Sidechain outliers	187428	2621 (1.66-1.66)
RSRZ outliers	180081	2564 (1.66-1.66)

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	258	
2	B	273	

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 8775 atoms, of which 4185 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 CCR4-NOT TRANSCRIPTION COMPLEX SUBUNIT 1.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	242	Total	C	H	N	O	S	0	6	0
			3890	1217	1945	359	350	19			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1350	GLY	-	expression tag	UNP A5YKK6
A	1351	PRO	-	expression tag	UNP A5YKK6
A	1352	HIS	-	expression tag	UNP A5YKK6
A	1353	MET	-	expression tag	UNP A5YKK6
A	1354	LEU	-	expression tag	UNP A5YKK6
A	1355	GLU	-	expression tag	UNP A5YKK6

- Molecule 2 is a protein called CELL DIFFERENTIATION PROTEIN RCD1 HOMOLOG.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
2	B	270	Total	C	H	N	O	S	0	1	0
			4383	1385	2224	371	393	10			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	13	GLY	-	expression tag	UNP Q92600
B	14	PRO	-	expression tag	UNP Q92600
B	15	HIS	-	expression tag	UNP Q92600
B	16	MET	-	expression tag	UNP Q92600
B	17	LEU	-	expression tag	UNP Q92600
B	18	GLU	-	expression tag	UNP Q92600

- Molecule 3 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	H	O	0	0
			14	3	8	3		
3	B	1	Total	C	H	O	0	0
			14	3	8	3		

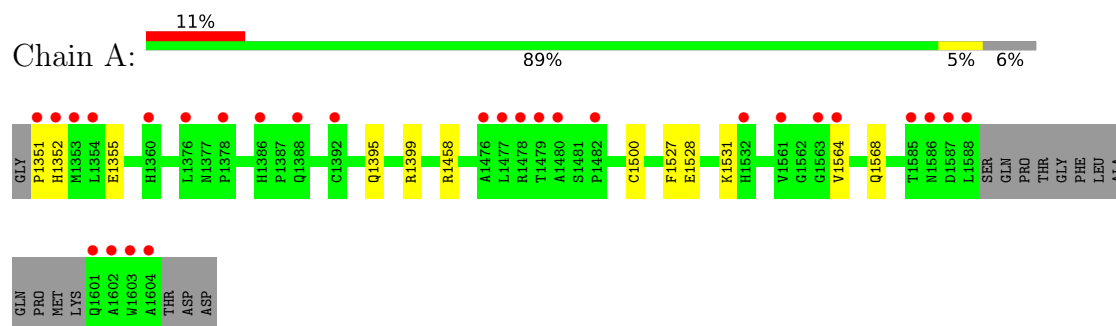
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	239	Total	O	0	0
			239	239		
4	B	235	Total	O	0	0
			235	235		

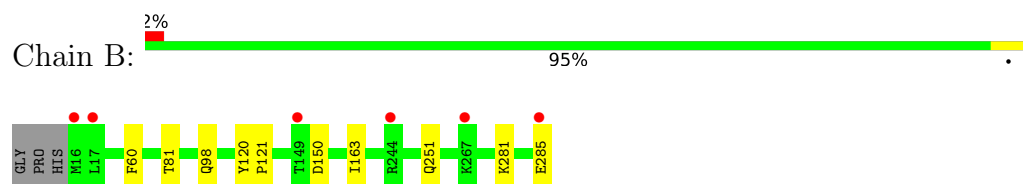
3 Residue-property plots

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: CCR4-NOT TRANSCRIPTION COMPLEX SUBUNIT 1



• Molecule 2: CELL DIFFERENTIATION PROTEIN RCD1 HOMOLOG



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	154.80Å 67.24Å 72.30Å 90.00° 99.64° 90.00°	Depositor
Resolution (Å)	76.31 – 1.65 76.31 – 1.65	Depositor EDS
% Data completeness (in resolution range)	99.5 (76.31-1.65) 99.5 (76.31-1.65)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.02	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.15 (at 1.65Å)	Xtriage
Refinement program	PHENIX (PHENIX.REFINE: 1.8.4_1496)	Depositor
R, R_{free}	0.160 , 0.179 0.166 , 0.184	Depositor DCC
R_{free} test set	4388 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	26.7	Xtriage
Anisotropy	0.088	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.39 , 46.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	8775	wwPDB-VP
Average B, all atoms (Å ²)	41.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.79% 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](#)

Bond lengths and bond angles in the following residue types are not validated in this section: GOL

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	0.66	0/2000	0.76	1/2701 (0.0%)
2	B	0.64	0/2204	0.79	0/2995
All	All	0.65	0/4204	0.78	1/5696 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1527	PHE	N-CA-C	-5.27	105.62	111.36

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	1945	1945	1955	9	0
2	B	2159	2224	2231	6	0
3	A	6	8	8	0	0
3	B	6	8	8	0	0
4	A	239	0	0	3	0
4	B	235	0	0	1	0
All	All	4590	4185	4202	12	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 1.

All (12) 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:1528:GLU:OE2	4:A:2187:HOH:O	2.12	0.67
1:A:1352:HIS:HB2	2:B:81:THR:HB	1.79	0.64
1:A:1399:ARG:NH2	4:A:2106:HOH:O	2.33	0.60
2:B:98:GLN:OE1	4:B:2060:HOH:O	2.17	0.58
1:A:1351:PRO:HD3	1:A:1355:GLU:OE2	2.04	0.57
1:A:1458:ARG:HD3	1:A:1500:CYS:SG	2.51	0.51
1:A:1568:GLN:NE2	4:A:2216:HOH:O	2.38	0.50
2:B:281:LYS:O	2:B:285:GLU:HG3	2.14	0.48
1:A:1564:VAL:HG11	2:B:60:PHE:CD2	2.50	0.47
1:A:1352:HIS:HB2	2:B:81:THR:CB	2.45	0.47
1:A:1395:GLN:OE1	1:A:1399:ARG:NH1	2.53	0.42
2:B:120:TYR:N	2:B:121:PRO:CD	2.84	0.41

There are no symmetry-related clashes.

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	244/258 (95%)	241 (99%)	3 (1%)	0	100	100
2	B	269/273 (98%)	267 (99%)	2 (1%)	0	100	100
All	All	513/531 (97%)	508 (99%)	5 (1%)	0	100	100

There are no Ramachandran outliers to report.

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	209/220 (95%)	208 (100%)	1 (0%)	81	72
2	B	243/246 (99%)	240 (99%)	3 (1%)	63	45
All	All	452/466 (97%)	448 (99%)	4 (1%)	70	56

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1531	LYS
2	B	150	ASP
2	B	163	ILE
2	B	251	GLN

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	1356	GLN
1	A	1490	GLN
2	B	278	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

2 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	GOL	B	1801	-	5,5,5	0.32	0	5,5,5	0.58	0
3	GOL	A	1801	-	5,5,5	0.36	0	5,5,5	0.28	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	GOL	B	1801	-	-	0/4/4/4	-
3	GOL	A	1801	-	-	2/4/4/4	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	1801	GOL	C1-C2-C3-O3
3	A	1801	GOL	O2-C2-C3-O3

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

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	242/258 (93%)	0.43	28 (11%) 9 10	20, 39, 88, 113	6 (2%)
2	B	270/273 (98%)	-0.13	6 (2%) 62 68	20, 35, 64, 101	1 (0%)
All	All	512/531 (96%)	0.13	34 (6%) 24 27	20, 36, 76, 113	7 (1%)

All (34) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	1588	LEU	9.5
1	A	1477	LEU	5.7
1	A	1604	ALA	5.1
2	B	16	MET	4.8
1	A	1601	GLN	4.6
2	B	17	LEU	4.5
1	A	1352	HIS	4.2
1	A	1351	PRO	4.1
1	A	1587	ASP	3.8
1	A	1354	LEU	3.7
1	A	1479	THR	3.4
1	A	1586	ASN	3.4
1	A	1532[A]	HIS	3.2
1	A	1603	TRP	3.1
1	A	1480	ALA	3.1
1	A	1585	THR	2.9
1	A	1602	ALA	2.9
1	A	1353	MET	2.9
2	B	149	THR	2.9
1	A	1376	LEU	2.7
1	A	1476	ALA	2.6
1	A	1478	ARG	2.6
2	B	285	GLU	2.6
1	A	1392	CYS	2.5

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Mol	Chain	Res	Type	RSRZ
1	A	1482	PRO	2.5
2	B	267	LYS	2.5
1	A	1564	VAL	2.4
1	A	1378	PRO	2.3
1	A	1388	GLN	2.3
1	A	1386	HIS	2.2
2	B	244	ARG	2.2
1	A	1360[A]	HIS	2.1
1	A	1563	GLY	2.1
1	A	1561	VAL	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](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	GOL	A	1801	6/6	0.77	0.18	50,67,85,86	0
3	GOL	B	1801	6/6	0.88	0.12	45,65,78,80	0

6.5 Other polymers [i](#)

There are no such residues in this entry.