



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 4, 2026 – 08:20 PM UTC

PDB ID : 5IC9 / pdb_00005ic9
Title : Structure of the CTD complex of Utp12 and Utp13
Authors : Zhang, C.; Ye, K.
Deposited on : 2016-02-23
Resolution : 3.70 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

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

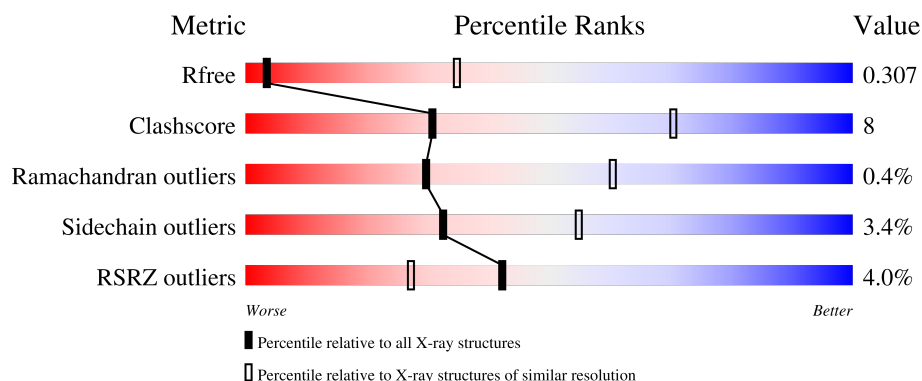
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.70 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))
R_{free}	180053	1131 (3.80-3.60)
Clashscore	190562	1171 (3.80-3.60)
Ramachandran outliers	187476	1129 (3.80-3.60)
Sidechain outliers	187428	1126 (3.80-3.60)
RSRZ outliers	180081	1130 (3.80-3.60)

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	209	2% 47% 13% • 38%
1	C	209	4% 47% 15% • 36%
2	B	175	3% 59% 14% • 25%
2	D	175	• 42% 17% 41%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 4015 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.

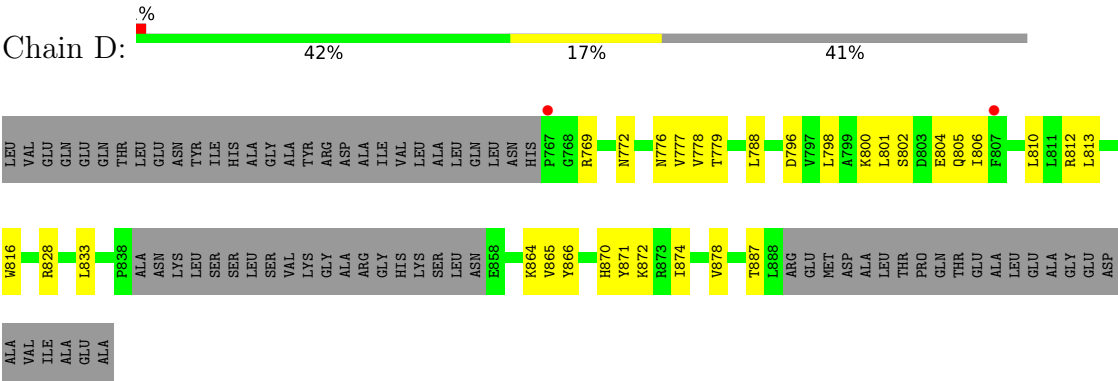
- Molecule 1 is a protein called Putative uncharacterized protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	129	Total	C	N	O	S	0	0	0
			1025	655	183	181	6			
1	C	134	Total	C	N	O	S	0	0	0
			1072	685	191	190	6			

- Molecule 2 is a protein called Putative uncharacterized protein.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	B	132	Total	C	N	O	0	0	0
			1074	685	188	201			
2	D	103	Total	C	N	O	0	0	0
			844	541	146	157			

● Molecule 2: Putative uncharacterized protein



4 Data and refinement statistics

Property	Value	Source
Space group	P 63 2 2	Depositor
Cell constants a, b, c, α , β , γ	160.31Å 160.31Å 134.70Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	29.90 – 3.70 29.90 – 3.70	Depositor EDS
% Data completeness (in resolution range)	99.9 (29.90-3.70) 90.6 (29.90-3.70)	Depositor EDS
R_{merge}	0.17	Depositor
R_{sym}	0.17	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.88 (at 3.66Å)	Xtriage
Refinement program	PHENIX 1.8.4_1496	Depositor
R, R_{free}	0.275 , 0.299 0.284 , 0.307	Depositor DCC
R_{free} test set	1146 reflections (9.99%)	wwPDB-VP
Wilson B-factor (Å ²)	122.0	Xtriage
Anisotropy	0.257	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 113.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.90	EDS
Total number of atoms	4015	wwPDB-VP
Average B, all atoms (Å ²)	139.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.79% 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

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	0.38	0/1036	0.86	3/1396 (0.2%)
1	C	0.38	0/1087	0.85	3/1467 (0.2%)
2	B	0.36	0/1094	0.76	2/1491 (0.1%)
2	D	0.36	0/860	0.77	0/1170
All	All	0.37	0/4077	0.81	8/5524 (0.1%)

There are no bond length outliers.

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	854	ILE	CB-CA-C	-6.66	107.29	114.35
1	A	849	LEU	CA-C-N	5.73	125.69	119.78
1	A	849	LEU	C-N-CA	5.73	125.69	119.78
1	A	871	VAL	CB-CA-C	-5.37	108.66	114.35
2	B	784	ASP	CA-C-N	5.30	124.97	119.56
2	B	784	ASP	C-N-CA	5.30	124.97	119.56
1	C	815	ASN	CA-C-N	-5.21	113.32	119.84
1	C	815	ASN	C-N-CA	-5.21	113.32	119.84

There are no chirality outliers.

There are no planarity outliers.

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	1025	0	1092	19	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	C	1072	0	1125	24	0
2	B	1074	0	1076	15	0
2	D	844	0	855	17	0
All	All	4015	0	4148	68	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 8.

All (68) 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:854:ILE:HG13	1:A:855:PRO:HD3	1.58	0.84
1:C:871:VAL:HG23	1:C:872:PRO:HD3	1.78	0.64
1:C:861:LEU:HD22	1:C:874:THR:HG23	1.78	0.64
1:C:815:ASN:HB3	1:C:816:PRO:HD3	1.79	0.64
1:C:921:ILE:HG22	1:C:925:LYS:HE2	1.80	0.62
2:D:801:LEU:HB2	2:D:806:ILE:HG13	1.81	0.62
1:A:868:GLU:OE2	2:B:828:ARG:NH2	2.26	0.62
1:A:920:ASN:HD21	2:B:831:TRP:HB2	1.63	0.61
2:B:869:ARG:HH21	2:B:873:ARG:HH21	1.47	0.61
1:C:814:ARG:NH1	1:C:816:PRO:O	2.34	0.61
1:A:776:LEU:HD23	1:A:848:VAL:HG11	1.86	0.58
2:B:801:LEU:HG	2:B:805:GLN:HB2	1.85	0.58
1:C:868:GLU:HG3	1:C:912:ARG:HH12	1.70	0.57
1:C:833:THR:HA	1:C:836:LYS:HE2	1.87	0.56
2:D:810:LEU:HA	2:D:813:LEU:HB2	1.87	0.55
1:C:871:VAL:HG21	1:C:913:GLN:OE1	2.07	0.55
2:B:831:TRP:CZ2	2:B:835:LYS:HD2	2.42	0.55
2:D:769:ARG:HD3	2:D:772:ASN:HB2	1.89	0.55
1:A:830:VAL:HG11	1:A:860:PHE:CD1	2.43	0.53
1:C:909:ALA:O	1:C:913:GLN:HG2	2.09	0.53
2:D:801:LEU:HD23	2:D:805:GLN:HB3	1.91	0.52
1:C:914:LYS:NZ	2:D:871:TYR:OH	2.43	0.52
1:A:838:LYS:HD2	1:A:839:PRO:HD2	1.92	0.52
1:A:852:SER:O	1:A:855:PRO:HD2	2.10	0.52
1:A:927:VAL:HA	1:A:930:GLN:HG2	1.92	0.51
1:A:772:THR:O	1:A:775:THR:OG1	2.24	0.49
1:A:849:LEU:HD12	1:A:850:PRO:HD2	1.95	0.48
2:B:788:LEU:HD23	2:B:832:ALA:HA	1.95	0.48
1:C:814:ARG:NH1	1:C:816:PRO:HD2	2.28	0.48
1:C:912:ARG:HH21	2:D:828:ARG:HH21	1.61	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:873:LEU:O	1:C:877:ILE:HG13	2.13	0.47
1:A:779:GLY:O	1:A:782:ILE:HG12	2.15	0.47
2:D:874:ILE:O	2:D:878:VAL:HG23	2.14	0.47
1:C:868:GLU:CD	1:C:912:ARG:HH22	2.23	0.46
2:D:776:ASN:HA	2:D:779:THR:HG22	1.96	0.46
1:C:832:ASN:O	1:C:836:LYS:HG3	2.15	0.46
1:A:861:LEU:HD21	1:A:877:ILE:HG22	1.97	0.46
1:C:790:MET:HE3	1:C:856:SER:HB2	1.97	0.46
1:C:900:GLU:CD	1:C:903:ARG:HH12	2.23	0.45
2:B:749:ILE:HG21	2:B:756:ASP:HB2	1.99	0.45
1:A:914:LYS:HB2	2:B:874:ILE:HG21	1.98	0.45
1:C:862:ASN:HB2	1:C:902:VAL:HG22	1.99	0.45
1:C:799:TRP:CG	1:C:812:PRO:HG3	2.51	0.45
2:B:747:ASN:O	2:B:750:HIS:HB3	2.16	0.45
2:B:814:ARG:NH1	2:B:859:VAL:HG12	2.32	0.45
1:C:912:ARG:NH2	2:D:828:ARG:HH21	2.15	0.44
2:D:812:ARG:HB3	2:D:816:TRP:CZ2	2.52	0.44
1:A:792:ASP:O	1:A:796:ILE:HG13	2.17	0.44
2:B:762:LEU:HD13	2:B:805:GLN:HB3	1.99	0.44
1:C:825:PRO:HA	1:C:826:ALA:HA	1.55	0.43
2:D:796:ASP:O	2:D:800:LYS:HG2	2.18	0.43
2:D:798:LEU:HA	2:D:801:LEU:HD11	1.99	0.43
1:C:861:LEU:HD11	1:C:877:ILE:HG22	1.99	0.43
2:D:872:LYS:HD2	2:D:872:LYS:HA	1.85	0.43
2:D:802:SER:C	2:D:804:GLU:H	2.27	0.43
2:B:761:ALA:HB3	2:B:770:LEU:HD13	2.01	0.42
1:A:899:LEU:HA	1:A:902:VAL:HG12	2.01	0.42
2:D:777:VAL:HG23	2:D:778:VAL:HG13	2.02	0.42
2:D:866:TYR:O	2:D:870:HIS:ND1	2.52	0.42
1:A:878:LEU:HD22	1:A:906:LEU:HD12	2.02	0.41
1:A:930:GLN:NE2	2:B:839:ALA:O	2.44	0.41
2:B:819:ASN:HB3	2:B:822:THR:OG1	2.20	0.41
1:A:839:PRO:O	1:A:842:LEU:HD12	2.20	0.41
2:B:837:HIS:HA	2:B:838:PRO:HD3	1.87	0.41
1:C:777:MET:H	1:C:777:MET:HG2	1.55	0.40
1:C:830:VAL:HG12	1:C:834:LEU:HD23	2.03	0.40
1:A:911:ARG:HA	1:A:911:ARG:HD3	1.87	0.40
2:D:864:LYS:HB2	2:D:864:LYS:HE3	1.90	0.40

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	123/209 (59%)	121 (98%)	2 (2%)	0	100	100
1	C	126/209 (60%)	123 (98%)	3 (2%)	0	100	100
2	B	128/175 (73%)	125 (98%)	2 (2%)	1 (1%)	16	48
2	D	99/175 (57%)	96 (97%)	2 (2%)	1 (1%)	12	43
All	All	476/768 (62%)	465 (98%)	9 (2%)	2 (0%)	30	60

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	839	ALA
2	D	788	LEU

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	113/183 (62%)	111 (98%)	2 (2%)	51	67
1	C	118/183 (64%)	113 (96%)	5 (4%)	26	51
2	B	117/150 (78%)	112 (96%)	5 (4%)	26	50
2	D	94/150 (63%)	91 (97%)	3 (3%)	34	56
All	All	442/666 (66%)	427 (97%)	15 (3%)	32	55

All (15) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	830	VAL
1	A	842	LEU
2	B	791	LEU
2	B	795	ASP
2	B	801	LEU
2	B	810	LEU
2	B	828	ARG
1	C	777	MET
1	C	808	ASN
1	C	834	LEU
1	C	863	LEU
1	C	913	GLN
2	D	833	LEU
2	D	865	VAL
2	D	887	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	920	ASN
2	B	776	ASN
1	C	794	ASN
2	D	805	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

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	129/209 (61%)	0.29	5 (3%)	43	28	105, 145, 179, 190	0
1	C	134/209 (64%)	0.44	8 (5%)	27	19	100, 140, 181, 197	0
2	B	132/175 (75%)	0.51	5 (3%)	44	28	105, 131, 171, 181	0
2	D	103/175 (58%)	0.33	2 (1%)	66	42	100, 127, 168, 194	0
All	All	498/768 (64%)	0.40	20 (4%)	42	27	100, 137, 177, 197	0

All (20) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	746	GLU	3.6
2	D	767	PRO	3.4
2	D	807	PHE	3.1
2	B	783	PRO	2.9
1	A	911	ARG	2.7
2	B	782	ASN	2.6
1	A	773	VAL	2.6
1	C	782	ILE	2.6
1	C	826	ALA	2.5
1	C	773	VAL	2.5
1	C	801	GLU	2.4
1	A	827	GLU	2.4
1	C	805	ILE	2.3
1	C	882	LEU	2.3
1	C	850	PRO	2.3
2	B	791	LEU	2.3
2	B	751	ALA	2.2
1	A	913	GLN	2.1
1	C	857	LEU	2.1
1	A	928	SER	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.