



Full wwPDB X-ray Structure Validation Report ⓘ

Aug 26, 2025 – 04:05 pm BST

PDB ID : 4CB9 / pdb_00004cb9
Title : Structure of full-length CTNNB1 in P43212 space group
Authors : Ganesh, K.; vanMaldegem, F.; Telerman, S.B.; Simpson, P.; Johnson, C.M.;
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Deposited on : 2013-10-10
Resolution : 3.00 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 Phenix2.0rc1
Xtriage (Phenix) : 2.0rc1
EDS : 3.0
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4 : 9.0.006 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.45.1

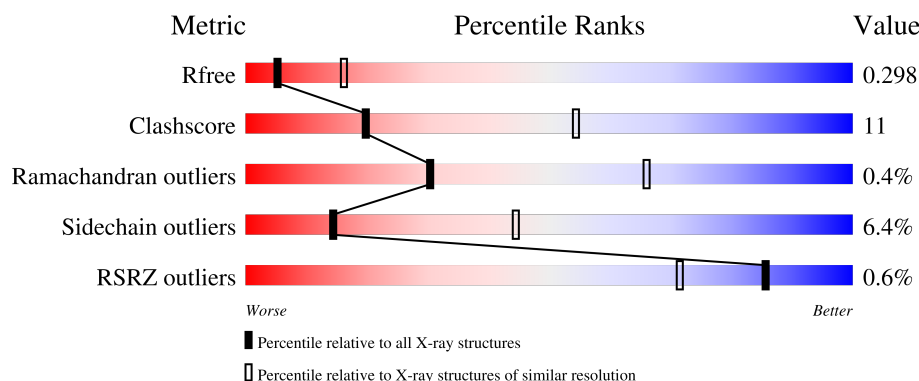
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.00 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}	164625	2511 (3.00-3.00)
Clashscore	180529	2866 (3.00-3.00)
Ramachandran outliers	177936	2778 (3.00-3.00)
Sidechain outliers	177891	2781 (3.00-3.00)
RSRZ outliers	164620	2523 (3.00-3.00)

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	571	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 3876 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 BETA-CATENIN-LIKE PROTEIN 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	482	Total	C	N	O	S	0	0	0
			3874	2427	676	744	27			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-7	MET	-	expression tag	UNP Q8WYA6
A	-6	ALA	-	expression tag	UNP Q8WYA6
A	-5	HIS	-	expression tag	UNP Q8WYA6
A	-4	HIS	-	expression tag	UNP Q8WYA6
A	-3	HIS	-	expression tag	UNP Q8WYA6
A	-2	HIS	-	expression tag	UNP Q8WYA6
A	-1	HIS	-	expression tag	UNP Q8WYA6
A	0	HIS	-	expression tag	UNP Q8WYA6

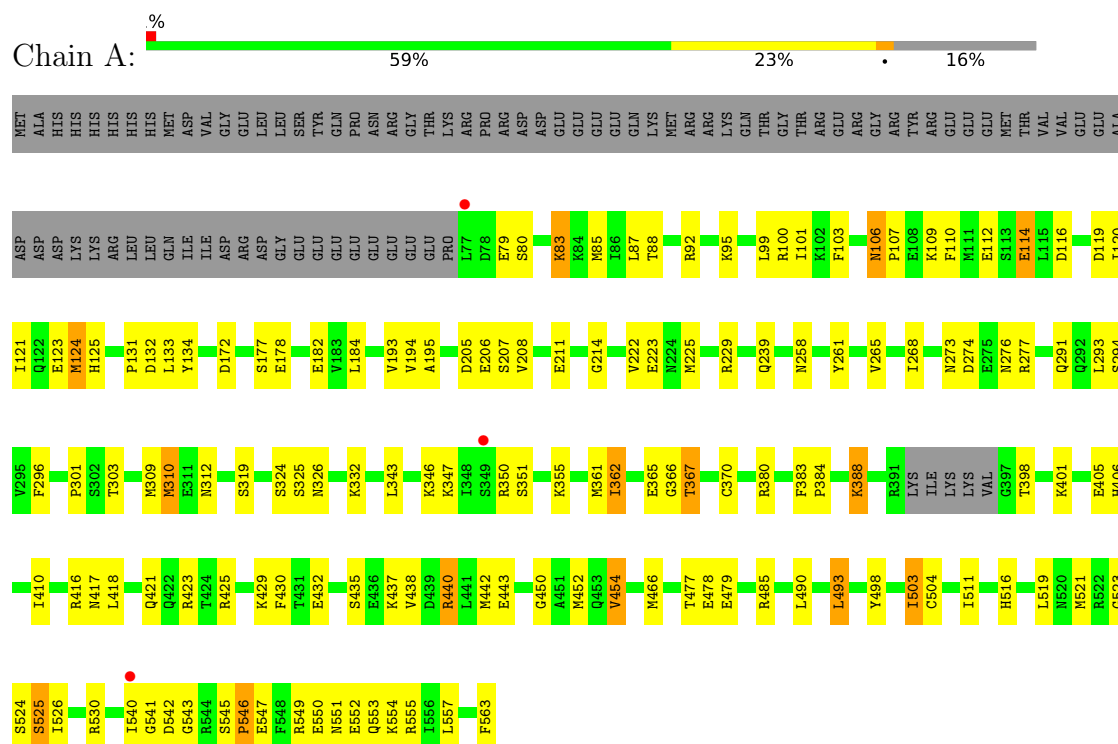
- Molecule 2 is water.

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

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: BETA-CATENIN-LIKE PROTEIN 1



4 Data and refinement statistics

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α , β , γ	66.73Å 66.73Å 325.88Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	65.46 – 3.00 65.46 – 3.00	Depositor EDS
% Data completeness (in resolution range)	100.0 (65.46-3.00) 100.0 (65.46-3.00)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.28 (at 3.01Å)	Xtriage
Refinement program	REFMAC 5.7.0032	Depositor
R, R_{free}	0.218 , 0.299 0.219 , 0.298	Depositor DCC
R_{free} test set	787 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å ²)	81.0	Xtriage
Anisotropy	0.046	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 57.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	3876	wwPDB-VP
Average B, all atoms (Å ²)	88.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.94% 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	0.68	0/3924	1.01	6/5275 (0.1%)

There are no bond length outliers.

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	362	ILE	N-CA-C	7.49	117.56	110.30
1	A	229	ARG	CA-C-N	5.43	125.08	119.05
1	A	229	ARG	C-N-CA	5.43	125.08	119.05
1	A	106	ASN	CA-C-N	5.30	126.47	119.84
1	A	106	ASN	C-N-CA	5.30	126.47	119.84
1	A	454	VAL	CB-CA-C	-5.05	105.32	112.14

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	3874	0	3899	88	0
2	A	2	0	0	0	0
All	All	3876	0	3899	88	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 11.

All (88) 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:343:LEU:HD23	1:A:350:ARG:HG3	1.37	1.06
1:A:503:ILE:HG23	1:A:511:ILE:HG21	1.75	0.69
1:A:92:ARG:HE	1:A:116:ASP:HB3	1.57	0.69
1:A:343:LEU:CD2	1:A:350:ARG:HG3	2.20	0.69
1:A:526:ILE:O	1:A:530:ARG:HG3	1.94	0.68
1:A:273:ASN:OD1	1:A:276:ASN:CG	2.37	0.67
1:A:120:ILE:O	1:A:124:MET:HG2	1.95	0.67
1:A:452:MET:HE3	1:A:490:LEU:CA	2.25	0.66
1:A:452:MET:HE3	1:A:490:LEU:HA	1.77	0.66
1:A:452:MET:HE1	1:A:485:ARG:O	1.96	0.66
1:A:401:LYS:O	1:A:405:GLU:HG3	1.95	0.64
1:A:418:LEU:O	1:A:423:ARG:NH1	2.31	0.64
1:A:450:GLY:O	1:A:454:VAL:HG23	1.97	0.63
1:A:205:ASP:OD1	1:A:205:ASP:C	2.41	0.63
1:A:361:MET:HE3	1:A:410:ILE:HG23	1.80	0.63
1:A:503:ILE:CG2	1:A:511:ILE:HG21	2.30	0.62
1:A:346:LYS:HD3	1:A:350:ARG:NE	2.15	0.61
1:A:503:ILE:CG2	1:A:511:ILE:CG2	2.80	0.60
1:A:466:MET:HE1	1:A:477:THR:HG21	1.84	0.58
1:A:519:LEU:O	1:A:523:GLY:N	2.36	0.58
1:A:365:GLU:OE1	1:A:365:GLU:N	2.26	0.57
1:A:367:THR:OG1	1:A:417:ASN:ND2	2.34	0.57
1:A:351:SER:HB3	1:A:398:THR:OG1	2.04	0.57
1:A:291:GLN:O	1:A:294:SER:HB3	2.05	0.57
1:A:107:PRO:HA	1:A:110:PHE:CZ	2.40	0.56
1:A:206:GLU:OE1	1:A:258:ASN:OD1	2.24	0.56
1:A:388:LYS:HE3	1:A:388:LYS:HA	1.87	0.55
1:A:541:GLY:C	1:A:543:GLY:HA3	2.32	0.55
1:A:83:LYS:O	1:A:87:LEU:HD12	2.08	0.54
1:A:103:PHE:CD2	1:A:109:LYS:HG2	2.43	0.54
1:A:107:PRO:HA	1:A:110:PHE:CE1	2.43	0.53
1:A:103:PHE:HB3	1:A:106:ASN:HB3	1.91	0.53
1:A:103:PHE:CE2	1:A:109:LYS:HG2	2.44	0.53
1:A:355:LYS:HG2	1:A:406:HIS:CE1	2.44	0.52
1:A:178:GLU:O	1:A:182:GLU:HB2	2.09	0.52
1:A:416:ARG:NH2	1:A:552:GLU:OE1	2.41	0.52
1:A:131:PRO:HB2	1:A:177:SER:HB3	1.92	0.52
1:A:273:ASN:OD1	1:A:276:ASN:ND2	2.43	0.52
1:A:503:ILE:HG23	1:A:511:ILE:CG2	2.40	0.51
1:A:524:SER:HA	1:A:525:SER:HB3	1.92	0.50
1:A:553:GLN:O	1:A:557:LEU:HG	2.12	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:540:ILE:HG23	1:A:541:GLY:HA2	1.94	0.49
1:A:274:ASP:HA	1:A:277:ARG:HD2	1.95	0.49
1:A:193:VAL:HG11	1:A:225:MET:HE1	1.93	0.48
1:A:206:GLU:C	1:A:208:VAL:H	2.19	0.48
1:A:309:MET:O	1:A:312:ASN:HB2	2.13	0.48
1:A:293:LEU:HA	1:A:310:MET:HE1	1.96	0.48
1:A:524:SER:HA	1:A:525:SER:CB	2.43	0.48
1:A:542:ASP:N	1:A:543:GLY:CA	2.77	0.48
1:A:516:HIS:CE1	1:A:563:PHE:O	2.67	0.47
1:A:383:PHE:N	1:A:384:PRO:CD	2.77	0.47
1:A:131:PRO:HA	1:A:134:TYR:CE1	2.49	0.47
1:A:503:ILE:HG22	1:A:504:CYS:N	2.29	0.47
1:A:95:LYS:O	1:A:99:LEU:HD13	2.15	0.47
1:A:380:ARG:O	1:A:384:PRO:CD	2.63	0.46
1:A:430:PHE:O	1:A:435:SER:HA	2.15	0.46
1:A:452:MET:HE3	1:A:490:LEU:N	2.30	0.45
1:A:366:GLY:O	1:A:370:CYS:SG	2.68	0.45
1:A:296:PHE:CE1	1:A:301:PRO:HA	2.52	0.45
1:A:438:VAL:O	1:A:442:MET:HG2	2.16	0.45
1:A:92:ARG:NE	1:A:116:ASP:HB3	2.28	0.45
1:A:351:SER:CB	1:A:398:THR:OG1	2.65	0.44
1:A:205:ASP:OD1	1:A:207:SER:N	2.51	0.43
1:A:193:VAL:HG13	1:A:194:VAL:N	2.33	0.43
1:A:503:ILE:CG2	1:A:511:ILE:HG23	2.48	0.43
1:A:79:GLU:O	1:A:83:LYS:HB2	2.19	0.43
1:A:347:LYS:O	1:A:350:ARG:HB3	2.19	0.43
1:A:124:MET:O	1:A:125:HIS:C	2.61	0.42
1:A:211:GLU:O	1:A:214:GLY:N	2.52	0.42
1:A:265:VAL:HA	1:A:268:ILE:HD12	2.02	0.42
1:A:540:ILE:CG2	1:A:541:GLY:HA2	2.50	0.42
1:A:223:GLU:OE1	1:A:261:TYR:OH	2.20	0.42
1:A:195:ALA:HB2	1:A:239:GLN:HG2	2.02	0.42
1:A:324:SER:O	1:A:326:ASN:N	2.53	0.42
1:A:85:MET:HG3	1:A:120:ILE:HD11	2.02	0.42
1:A:440:ARG:O	1:A:443:GLU:HB3	2.20	0.41
1:A:100:ARG:NH2	1:A:114:GLU:OE2	2.44	0.41
1:A:119:ASP:O	1:A:123:GLU:HG3	2.20	0.41
1:A:547:GLU:O	1:A:551:ASN:ND2	2.54	0.41
1:A:121:ILE:HA	1:A:124:MET:HG3	2.03	0.41
1:A:134:TYR:CD2	1:A:184:LEU:HD22	2.56	0.41
1:A:498:TYR:OH	1:A:555:ARG:NH2	2.54	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:132:ASP:C	1:A:134:TYR:N	2.78	0.41
1:A:343:LEU:O	1:A:346:LYS:HE3	2.21	0.40
1:A:452:MET:HG3	1:A:493:LEU:HD23	2.04	0.40
1:A:546:PRO:HA	1:A:549:ARG:NH1	2.36	0.40
1:A:421:GLN:O	1:A:425:ARG:HG3	2.21	0.40
1:A:429:LYS:O	1:A:437:LYS:HG2	2.22	0.40

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	478/571 (84%)	460 (96%)	16 (3%)	2 (0%)	30 66

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	133	LEU
1	A	546	PRO

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	435/517 (84%)	407 (94%)	28 (6%)	14 44

All (28) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	80	SER
1	A	83	LYS
1	A	88	THR
1	A	101	ILE
1	A	112	GLU
1	A	114	GLU
1	A	124	MET
1	A	172	ASP
1	A	222	VAL
1	A	303	THR
1	A	310	MET
1	A	319	SER
1	A	325	SER
1	A	332	LYS
1	A	362	ILE
1	A	367	THR
1	A	388	LYS
1	A	432	GLU
1	A	440	ARG
1	A	478	GLU
1	A	479	GLU
1	A	493	LEU
1	A	503	ILE
1	A	521	MET
1	A	525	SER
1	A	545	SER
1	A	550	GLU
1	A	554	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (14) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	96	ASN
1	A	141	ASN
1	A	224	ASN
1	A	258	ASN
1	A	271	GLN
1	A	299	HIS
1	A	371	HIS
1	A	406	HIS
1	A	417	ASN

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Mol	Chain	Res	Type
1	A	445	HIS
1	A	475	ASN
1	A	495	HIS
1	A	551	ASN
1	A	553	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	482/571 (84%)	-0.32	3 (0%)	85 71	51, 81, 134, 164	0

All (3) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	540	ILE	3.7
1	A	349	SER	3.2
1	A	77	LEU	2.3

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.