Full wwPDB X-ray Structure Validation Report ⓘ

Feb 28, 2026 – 09:39 PM UTC

PDB ID	:	8Y0G / pdb_00008y0g
Title	:	Human beta-catenin crystal structure
Authors	:	Tim, F.
Deposited on	:	2024-01-22
Resolution	:	2.50 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:

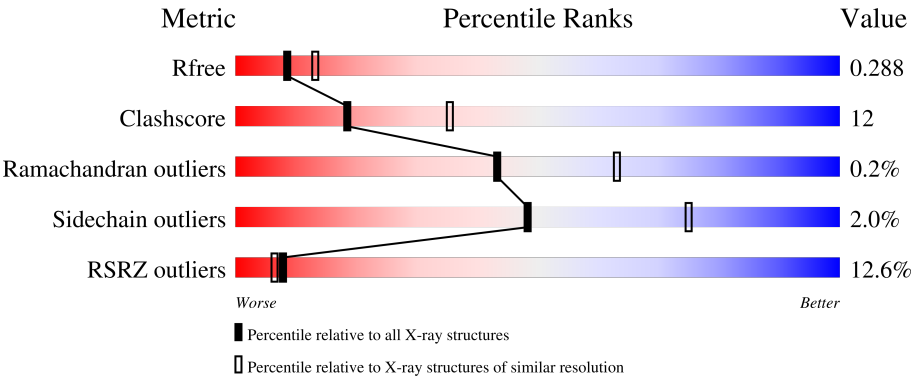
MolProbity	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.50 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	5829 (2.50-2.50)
Clashscore	190562	6492 (2.50-2.50)
Ramachandran outliers	187476	6378 (2.50-2.50)
Sidechain outliers	187428	6380 (2.50-2.50)
RSRZ outliers	180081	5833 (2.50-2.50)

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 <=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	549	12% 71% 21% • 7%

2 Entry composition (i)

There is only 1 type of molecule in this entry. The entry contains 3771 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 Catenin beta-1.

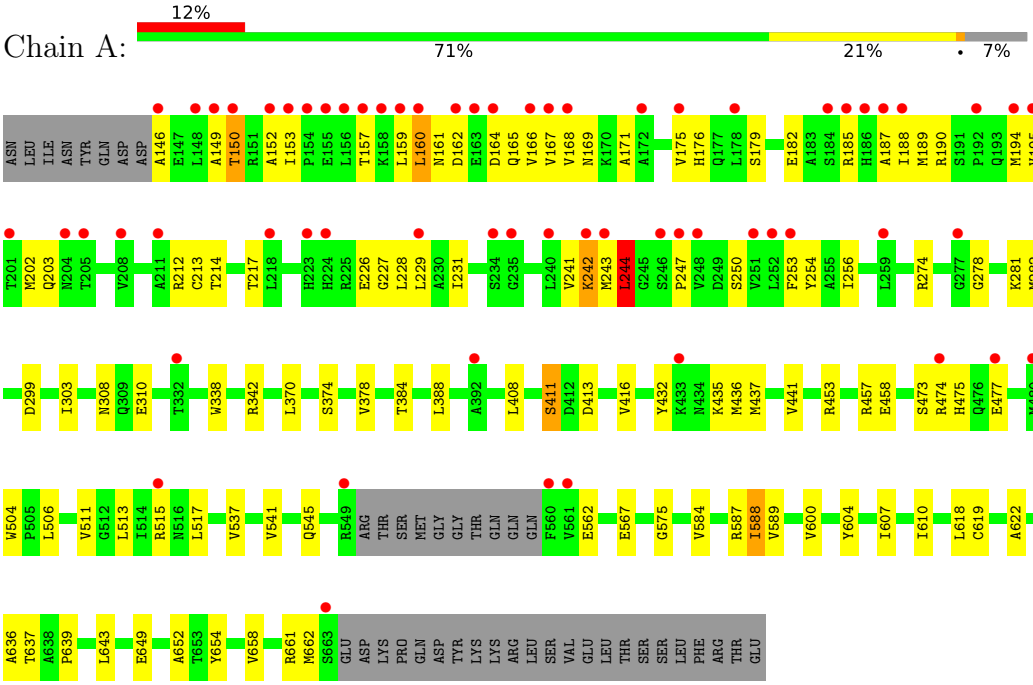
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	508	3771	2369	680	698	24	0	0	0

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 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: Catenin beta-1

Chain A:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α, β, γ	63.84Å 103.43Å 186.42Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.00 – 2.50 50.00 – 2.50	Depositor EDS
% Data completeness (in resolution range)	92.4 (50.00-2.50) 92.4 (50.00-2.50)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.58 (at 2.51Å)	Xtriage
Refinement program	REFMAC 5.5	Depositor
R, R_{free}	0.238 , 0.287 0.246 , 0.288	Depositor DCC
R_{free} test set	1030 reflections (4.74%)	wwPDB-VP
Wilson B-factor (Å^2)	58.8	Xtriage
Anisotropy	0.033	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.31 , 30.7	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	3771	wwPDB-VP
Average B, all atoms (Å^2)	72.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.04% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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	0.23	0/3824	0.39	3/5208 (0.1%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	150	THR	N-CA-C	-7.00	102.71	111.11
1	A	244	LEU	N-CA-C	-5.47	106.44	113.01
1	A	159	LEU	CB-CA-C	5.31	121.09	109.99

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	3771	0	3817	91	0
All	All	3771	0	3817	91	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 12.

All (91) 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:146:ALA:HA	1:A:149:ALA:HB3	1.47	0.95
1:A:515:ARG:HH21	1:A:575:GLY:HA3	1.47	0.80
1:A:241:VAL:HA	1:A:244:LEU:HD22	1.65	0.77
1:A:162:ASP:HB2	1:A:168:VAL:HB	1.67	0.75
1:A:504:TRP:HD1	1:A:562:GLU:HG3	1.57	0.70
1:A:189:MET:HG2	1:A:226:GLU:HG2	1.73	0.69
1:A:567:GLU:N	1:A:567:GLU:OE1	2.27	0.68
1:A:176:HIS:HB2	1:A:213:CYS:HB2	1.81	0.63
1:A:161:ASN:HD21	1:A:200:ARG:HH12	1.49	0.61
1:A:149:ALA:HB1	1:A:187:ALA:HB2	1.84	0.59
1:A:475:HIS:CE1	1:A:477:GLU:HG2	2.37	0.59
1:A:299:ASP:O	1:A:303:ILE:HG13	2.03	0.59
1:A:618:LEU:HD22	1:A:631:ILE:HG12	1.86	0.58
1:A:188:ILE:HG23	1:A:194:MET:HG3	1.84	0.58
1:A:164:ASP:OD2	1:A:167:VAL:HG23	2.04	0.58
1:A:584:VAL:HG12	1:A:587:ARG:HH22	1.68	0.58
1:A:607:ILE:HG22	1:A:610:ILE:H	1.69	0.58
1:A:164:ASP:C	1:A:166:VAL:H	2.12	0.57
1:A:274:ARG:CZ	1:A:308:ASN:HD22	2.19	0.56
1:A:203:GLN:HA	1:A:242:LYS:HE3	1.88	0.56
1:A:169:ASN:C	1:A:169:ASN:HD22	2.13	0.55
1:A:149:ALA:HA	1:A:152:ALA:HB3	1.88	0.55
1:A:165:GLN:HG2	1:A:166:VAL:HG23	1.89	0.55
1:A:202:MET:HG3	1:A:214:THR:HB	1.89	0.54
1:A:256:ILE:HG13	1:A:296:ILE:HG22	1.90	0.53
1:A:453:ARG:HH21	1:A:457:ARG:NH2	2.07	0.52
1:A:213:CYS:O	1:A:217:THR:OG1	2.26	0.52
1:A:619:CYS:HA	1:A:658:VAL:HG22	1.92	0.52
1:A:149:ALA:O	1:A:153:ILE:N	2.44	0.51
1:A:157:THR:HG22	1:A:194:MET:HE2	1.93	0.51
1:A:244:LEU:HB3	1:A:281:LYS:HB3	1.93	0.51
1:A:413:ASP:HB3	1:A:416:VAL:HB	1.93	0.50
1:A:146:ALA:CA	1:A:149:ALA:HB3	2.31	0.50
1:A:432:TYR:HD2	1:A:436:MET:HE1	1.77	0.50
1:A:195:VAL:HA	1:A:198:ILE:HD12	1.91	0.50
1:A:408:LEU:O	1:A:411:SER:HB3	2.11	0.50
1:A:627:ALA:O	1:A:631:ILE:HD12	2.13	0.49
1:A:588:ILE:HG12	1:A:589:VAL:N	2.27	0.49
1:A:160:LEU:HD23	1:A:194:MET:HB2	1.95	0.48
1:A:202:MET:HB2	1:A:214:THR:CG2	2.44	0.48
1:A:165:GLN:H	1:A:165:GLN:CD	2.22	0.48
1:A:604:TYR:CZ	1:A:639:PRO:HG3	2.48	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:149:ALA:O	1:A:150:THR:C	2.55	0.48
1:A:179:SER:HB3	1:A:217:THR:HG23	1.96	0.48
1:A:384:THR:O	1:A:388:LEU:HG	2.12	0.48
1:A:182:GLU:HA	1:A:185:ARG:HG2	1.95	0.48
1:A:162:ASP:HB2	1:A:168:VAL:CB	2.41	0.47
1:A:212:ARG:HG3	1:A:254:TYR:HE2	1.79	0.47
1:A:242:LYS:HG2	1:A:243:MET:HG2	1.96	0.47
1:A:511:VAL:O	1:A:515:ARG:HG3	2.16	0.46
1:A:150:THR:HG23	1:A:190:ARG:HH12	1.80	0.46
1:A:242:LYS:HE2	1:A:243:MET:HG2	1.98	0.46
1:A:226:GLU:CD	1:A:229:LEU:HD22	2.41	0.46
1:A:374:SER:O	1:A:378:VAL:HG23	2.16	0.46
1:A:278:GLY:O	1:A:282:MET:HG3	2.17	0.45
1:A:194:MET:HE2	1:A:194:MET:HB3	1.86	0.45
1:A:162:ASP:OD2	1:A:168:VAL:HA	2.16	0.45
1:A:164:ASP:C	1:A:166:VAL:N	2.72	0.45
1:A:202:MET:HB2	1:A:214:THR:HG21	1.99	0.45
1:A:308:ASN:OD1	1:A:310:GLU:HG2	2.17	0.45
1:A:338:TRP:O	1:A:342:ARG:HG3	2.17	0.45
1:A:600:VAL:HG22	1:A:636:ALA:HB2	1.99	0.44
1:A:165:GLN:HG2	1:A:166:VAL:CG2	2.46	0.44
1:A:497:LEU:HD22	1:A:506:LEU:HD21	1.98	0.44
1:A:437:MET:O	1:A:441:VAL:HG22	2.18	0.44
1:A:474:ARG:H	1:A:474:ARG:HH11	1.65	0.44
1:A:149:ALA:O	1:A:152:ALA:N	2.51	0.44
1:A:541:VAL:O	1:A:545:GLN:HG3	2.18	0.44
1:A:202:MET:CE	1:A:243:MET:HG3	2.48	0.44
1:A:458:GLU:OE2	1:A:503:HIS:ND1	2.44	0.43
1:A:212:ARG:NE	1:A:250:SER:OG	2.46	0.43
1:A:253:PHE:CD1	1:A:253:PHE:N	2.86	0.43
1:A:654:TYR:O	1:A:658:VAL:HG23	2.19	0.43
1:A:658:VAL:O	1:A:662:MET:HG3	2.18	0.43
1:A:435:LYS:HD3	1:A:475:HIS:HB2	1.99	0.43
1:A:515:ARG:NH2	1:A:575:GLY:HA3	2.26	0.42
1:A:153:ILE:O	1:A:157:THR:HG23	2.20	0.42
1:A:171:ALA:O	1:A:175:VAL:HG23	2.20	0.42
1:A:537:VAL:O	1:A:541:VAL:HG23	2.20	0.42
1:A:188:ILE:HA	1:A:194:MET:SD	2.61	0.41
1:A:513:LEU:O	1:A:517:LEU:HG	2.21	0.41
1:A:292:LYS:HB2	1:A:292:LYS:HE3	1.69	0.41
1:A:149:ALA:CA	1:A:152:ALA:HB3	2.49	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:432:TYR:O	1:A:436:MET:HE3	2.20	0.41
1:A:198:ILE:HG23	1:A:214:THR:HG23	2.01	0.41
1:A:227:GLY:O	1:A:231:ILE:HG13	2.20	0.41
1:A:370:LEU:HA	1:A:378:VAL:HG13	2.02	0.41
1:A:436:MET:HG3	1:A:475:HIS:CE1	2.56	0.41
1:A:473:SER:HB2	1:A:474:ARG:NH1	2.36	0.41
1:A:649:GLU:O	1:A:652:ALA:N	2.52	0.40
1:A:622:ALA:HB3	1:A:661:ARG:HD3	2.03	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	504/549 (92%)	492 (98%)	11 (2%)	1 (0%)	43 63

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	247	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	396/459 (86%)	388 (98%)	8 (2%)	48 75

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	160	LEU
1	A	228	LEU
1	A	242	LYS
1	A	244	LEU
1	A	411	SER
1	A	588	ILE
1	A	637	THR
1	A	643	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	161	ASN
1	A	169	ASN
1	A	308	ASN
1	A	322	GLN
1	A	379	GLN
1	A	387	ASN
1	A	440	GLN
1	A	475	HIS
1	A	544	HIS
1	A	623	GLN

5.3.3 RNA

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates

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, 95^{th} 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	508/549 (92%)	0.74	64 (12%) 8 6	42, 60, 132, 169	0

All (64) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	195	VAL	6.7
1	A	160	LEU	5.4
1	A	252	LEU	5.2
1	A	149	ALA	5.0
1	A	155	GLU	4.9
1	A	248	VAL	4.6
1	A	153	ILE	4.5
1	A	246	SER	4.2
1	A	152	ALA	4.1
1	A	251	VAL	4.0
1	A	168	VAL	3.8
1	A	253	PHE	3.4
1	A	148	LEU	3.4
1	A	175	VAL	3.3
1	A	243	MET	3.2
1	A	150	THR	3.2
1	A	561	VAL	3.2
1	A	188	ILE	3.0
1	A	199	VAL	3.0
1	A	474	ARG	3.0
1	A	184	SER	3.0
1	A	205	THR	2.8
1	A	194	MET	2.8
1	A	259	LEU	2.7
1	A	477	GLU	2.7
1	A	187	ALA	2.6
1	A	154	PRO	2.6

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Mol	Chain	Res	Type	RSRZ
1	A	163	GLU	2.6
1	A	218	LEU	2.6
1	A	247	PRO	2.5
1	A	240	LEU	2.5
1	A	172	ALA	2.5
1	A	277	GLY	2.5
1	A	157	THR	2.5
1	A	178	LEU	2.5
1	A	332	THR	2.5
1	A	204	ASN	2.4
1	A	208	VAL	2.4
1	A	162	ASP	2.4
1	A	156	LEU	2.4
1	A	223	HIS	2.4
1	A	515	ARG	2.4
1	A	211	ALA	2.4
1	A	159	LEU	2.3
1	A	229	LEU	2.3
1	A	164	ASP	2.3
1	A	480	MET	2.3
1	A	242	LYS	2.3
1	A	433	LYS	2.3
1	A	201	THR	2.3
1	A	560	PHE	2.2
1	A	392	ALA	2.2
1	A	235	GLY	2.2
1	A	166	VAL	2.2
1	A	167	VAL	2.2
1	A	224	HIS	2.2
1	A	192	PRO	2.2
1	A	663	SER	2.1
1	A	186	HIS	2.1
1	A	549	ARG	2.1
1	A	158	LYS	2.1
1	A	234	SER	2.1
1	A	146	ALA	2.0
1	A	185	ARG	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.