



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 13, 2026 – 03:15 AM UTC

PDB ID : 5IG5 / pdb_00005ig5
Title : Crystal structure of N. vectensis CaMKII-B hub at pH 4.2
Authors : Bhattacharyya, M.; Gee, C.L.; Barros, T.; Kuriyan, J.
Deposited on : 2016-02-26
Resolution : 3.00 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:

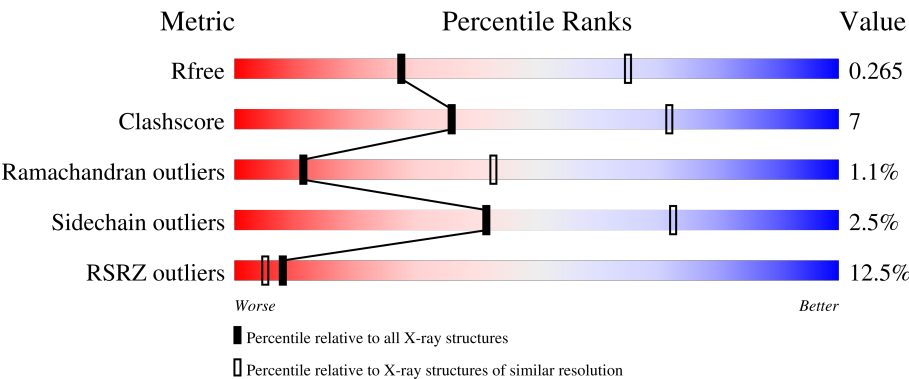
MolProbity	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
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 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}	180053	2672 (3.00-3.00)
Clashscore	190562	2977 (3.00-3.00)
Ramachandran outliers	187476	2877 (3.00-3.00)
Sidechain outliers	187428	2880 (3.00-3.00)
RSRZ outliers	180081	2671 (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	145	6% 74% 17% • 6%
1	B	145	11% 72% 19% • • 5%
1	C	145	8% 82% 11% • • 6%
1	D	145	7% 81% 12% • 6%
1	E	145	3% 79% 16% • •

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Mol	Chain	Length	Quality of chain
1	F	145	4% 78% 17% • •
1	G	145	44% 61% 33% • 5%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 8925 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 CaMKII-B hub.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	137	Total	C	N	O	S	0	0	0
			1100	695	188	215	2			
1	F	143	Total	C	N	O	S	0	1	0
			1164	732	206	224	2			
1	C	137	Total	C	N	O	S	0	0	0
			1104	697	191	214	2			
1	D	136	Total	C	N	O	S	0	0	0
			1094	690	188	214	2			
1	E	139	Total	C	N	O	S	0	0	0
			1118	707	193	216	2			
1	B	138	Total	C	N	O	S	0	0	0
			1111	701	192	216	2			
1	G	138	Total	C	N	O	S	0	138	0
			2222	1402	384	432	4			

There are 21 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	330	GLY	-	expression tag	UNP A7RF52
A	331	PRO	-	expression tag	UNP A7RF52
A	332	HIS	-	expression tag	UNP A7RF52
B	330	GLY	-	expression tag	UNP A7RF52
B	331	PRO	-	expression tag	UNP A7RF52
B	332	HIS	-	expression tag	UNP A7RF52
C	330	GLY	-	expression tag	UNP A7RF52
C	331	PRO	-	expression tag	UNP A7RF52
C	332	HIS	-	expression tag	UNP A7RF52
D	330	GLY	-	expression tag	UNP A7RF52
D	331	PRO	-	expression tag	UNP A7RF52
D	332	HIS	-	expression tag	UNP A7RF52
E	330	GLY	-	expression tag	UNP A7RF52
E	331	PRO	-	expression tag	UNP A7RF52
E	332	HIS	-	expression tag	UNP A7RF52

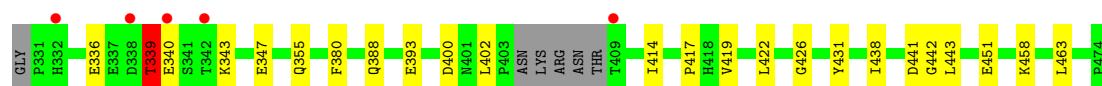
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Chain	Residue	Modelled	Actual	Comment	Reference
F	330	GLY	-	expression tag	UNP A7RF52
F	331	PRO	-	expression tag	UNP A7RF52
F	332	HIS	-	expression tag	UNP A7RF52
G	330	GLY	-	expression tag	UNP A7RF52
G	331	PRO	-	expression tag	UNP A7RF52
G	332	HIS	-	expression tag	UNP A7RF52

- Molecule 2 is water.

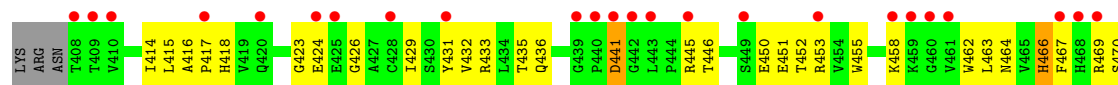
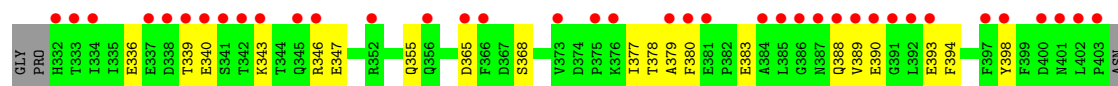
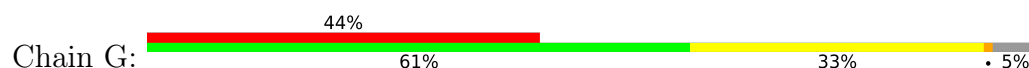
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total O 1 1	0	0
2	F	2	Total O 2 2	0	0
2	C	2	Total O 2 2	0	0
2	D	2	Total O 2 2	0	0
2	E	2	Total O 2 2	0	0
2	B	3	Total O 3 3	0	0



• Molecule 1: CaMKII-B hub



• Molecule 1: CaMKII-B hub



4 Data and refinement statistics

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, α , β , γ	113.97Å 113.97Å 241.65Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	49.35 – 3.00 49.35 – 3.00	Depositor EDS
% Data completeness (in resolution range)	99.9 (49.35-3.00) 92.2 (49.35-3.00)	Depositor EDS
R_{merge}	0.13	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.22 (at 3.01Å)	Xtriage
Refinement program	PHENIX (dev_2229: ???)	Depositor
R, R_{free}	0.232 , 0.270 0.237 , 0.265	Depositor DCC
R_{free} test set	1816 reflections (4.88%)	wwPDB-VP
Wilson B-factor (Å ²)	71.2	Xtriage
Anisotropy	0.332	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 101.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.032 for -h,-k,l	Xtriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	8925	wwPDB-VP
Average B, all atoms (Å ²)	102.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.89% 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 [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	0.17	0/1122	0.42	0/1521
1	B	0.19	0/1133	0.42	0/1535
1	C	0.14	0/1126	0.39	0/1525
1	D	0.13	0/1114	0.39	0/1508
1	E	0.19	0/1142	0.41	0/1548
1	F	0.15	0/1189	0.39	0/1611
1	G	0.09	0/2266	0.28	0/3070
All	All	0.15	0/9092	0.38	0/12318

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
1	C	0	1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	C	338	ASP	Peptide

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	1100	0	1083	18	0
1	B	1111	0	1096	26	0
1	C	1104	0	1089	13	0
1	D	1094	0	1082	13	0
1	E	1118	0	1104	15	0
1	F	1164	0	1149	17	0
1	G	2222	0	2192	38	0
2	A	1	0	0	0	0
2	B	3	0	0	0	0
2	C	2	0	0	0	0
2	D	2	0	0	0	0
2	E	2	0	0	0	0
2	F	2	0	0	0	0
All	All	8925	0	8795	130	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 7.

The worst 5 of 130 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:LYS:HB3	1:A:347:GLU:HG3	1.66	0.78
1:F:341:SER:HB3	1:C:341:SER:HB2	1.66	0.77
1:E:441:ASP:OD1	1:E:442:GLY:N	2.19	0.75
1:G:426[B]:GLY:HA3	1:G:455[B]:TRP:O	1.87	0.75
1:G:453[B]:ARG:NH1	1:G:464[B]:ASN:OD1	2.21	0.74

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	133/145 (92%)	129 (97%)	2 (2%)	2 (2%)	8	35
1	B	134/145 (92%)	128 (96%)	5 (4%)	1 (1%)	18	53
1	C	133/145 (92%)	128 (96%)	4 (3%)	1 (1%)	16	50
1	D	132/145 (91%)	126 (96%)	5 (4%)	1 (1%)	16	50
1	E	135/145 (93%)	128 (95%)	6 (4%)	1 (1%)	18	53
1	F	142/145 (98%)	136 (96%)	3 (2%)	3 (2%)	5	27
1	G	268/145 (185%)	244 (91%)	22 (8%)	2 (1%)	18	53
All	All	1077/1015 (106%)	1019 (95%)	47 (4%)	11 (1%)	11	45

5 of 11 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	F	339	THR
1	F	405	LYS
1	B	402	LEU
1	A	402	LEU
1	F	404	ASN

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	124/131 (95%)	119 (96%)	5 (4%)	28	62
1	B	125/131 (95%)	117 (94%)	8 (6%)	16	48
1	C	124/131 (95%)	123 (99%)	1 (1%)	73	86
1	D	123/131 (94%)	123 (100%)	0	100	100
1	E	126/131 (96%)	124 (98%)	2 (2%)	55	79
1	F	131/131 (100%)	126 (96%)	5 (4%)	29	63
1	G	250/131 (191%)	248 (99%)	2 (1%)	73	86
All	All	1003/917 (109%)	980 (98%)	23 (2%)	42	74

5 of 23 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	333	THR
1	B	401	ASN
1	B	400	ASP
1	B	402	LEU
1	F	377	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 13 such sidechains are listed below:

Mol	Chain	Res	Type
1	E	395	HIS
1	B	387	ASN
1	B	448	GLN
1	B	411	ASN
1	B	436	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	137/145 (94%)	0.17	8 (5%) 29 15	57, 84, 167, 216	0
1	B	138/145 (95%)	0.67	16 (11%) 9 5	69, 112, 193, 227	0
1	C	137/145 (94%)	0.56	12 (8%) 15 8	58, 116, 171, 206	0
1	D	136/145 (93%)	0.55	10 (7%) 20 10	68, 130, 188, 231	0
1	E	139/145 (95%)	0.15	5 (3%) 46 26	47, 72, 155, 179	0
1	F	143/145 (98%)	0.14	6 (4%) 40 22	31, 73, 170, 201	1 (0%)
1	G	138/145 (95%)	2.18	64 (46%) 0 0	28, 44, 75, 84	138 (100%)
All	All	968/1015 (95%)	0.63	121 (12%) 8 5	28, 90, 172, 231	139 (14%)

The worst 5 of 121 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	G	403[A]	PRO	8.6
1	G	402[A]	LEU	8.2
1	G	408[A]	THR	7.3
1	C	339	THR	6.4
1	G	332[A]	HIS	6.2

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.