



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 02:55 PM GMT

PDB ID : 4AZ8  
Title : Crystal structure of the complex of the Caf1M:Caf1 chaperone:subunit pre-assembly complex carrying the KDKDTN insertion at the F1G1 loop region  
Authors : Yu, X.D.; Dubnovitsky, A.; Pudney, A.F.; Macintyre, S.; Knight, S.D.; Zavialov, A.V.  
Deposited on : 2012-06-24  
Resolution : 2.65 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](mailto:validation@mail.wwpdb.org)  
A user guide is available at  
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>  
with specific help available everywhere you see the ⓘ symbol.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.7 (RC4), CSD as536be (2015)  
Xtriage (Phenix) : 1.9-1692  
EDS : rb-20026688  
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)  
Refmac : 5.8.0135  
CCP4 : 6.5.0  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : trunk26865

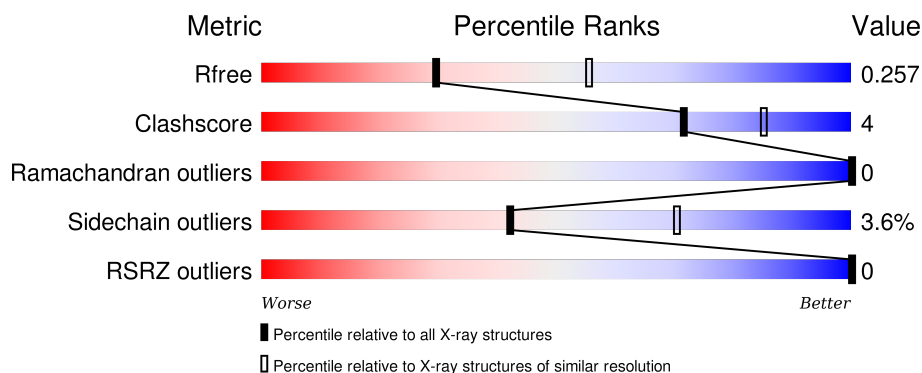
# 1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.65 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))
$R_{free}$	91344	3152 (2.70-2.62)
Clashscore	102246	3524 (2.70-2.62)
Ramachandran outliers	100387	3469 (2.70-2.62)
Sidechain outliers	100360	3469 (2.70-2.62)
RSRZ outliers	91569	3161 (2.70-2.62)

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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. 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	240	 64% 12% • 23%
2	B	149	 80% 5% 15%

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 2409 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 CHAPERONE PROTEIN CAF1M.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	186	Total	C	N	O	S	0	1	1
			1455	948	246	257	4			

There are 5 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	125A	LYS	-	INSERTION	UNP P26926
A	125B	ASP	-	INSERTION	UNP P26926
A	125C	THR	-	INSERTION	UNP P26926
A	125D	ASN	-	INSERTION	UNP P26926
A	125E	ASP	-	INSERTION	UNP P26926

- Molecule 2 is a protein called F1 CAPSULE ANTIGEN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	126	Total	C	N	O	S	0	0	0
			912	573	148	190	1			

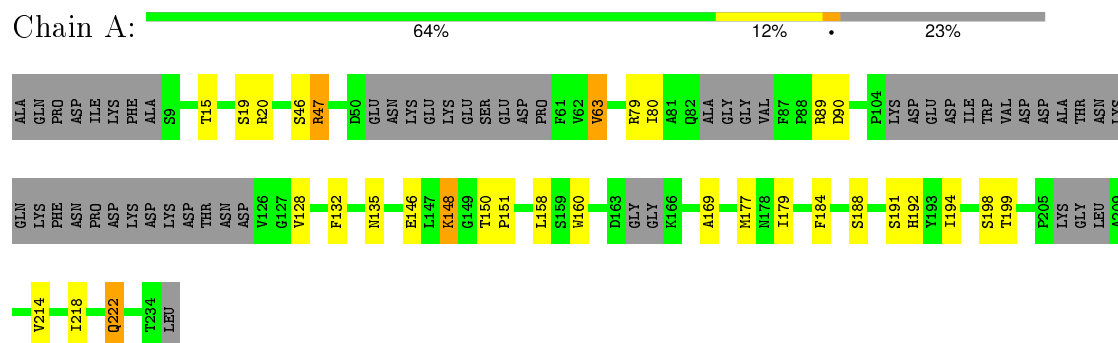
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	18	Total	O	0	0
			18	18		
3	B	24	Total	O	0	0
			24	24		

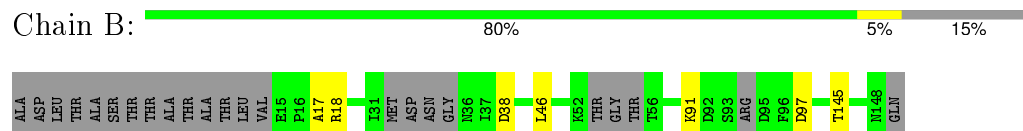
### 3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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: CHAPERONE PROTEIN CAF1M



#### • Molecule 2: F1 CAPSULE ANTIGEN



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	35.51Å 69.31Å 66.03Å 90.00° 94.82° 90.00°	Depositor
Resolution (Å)	29.72 – 2.65 47.72 – 2.65	Depositor EDS
% Data completeness (in resolution range)	99.9 (29.72-2.65) 99.9 (47.72-2.65)	Depositor EDS
$R_{merge}$	0.11	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.13 (at 2.65Å)	Xtriage
Refinement program	PHENIX (PHENIX.REFINE)	Depositor
R, $R_{free}$	0.221 , 0.251 0.226 , 0.257	Depositor DCC
$R_{free}$ test set	446 reflections (5.01%)	DCC
Wilson B-factor (Å <sup>2</sup> )	22.2	Xtriage
Anisotropy	0.475	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.32 , 39.0	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtriage
Outliers	0 of 9372 reflections	Xtriage
$F_o, F_c$ correlation	0.89	EDS
Total number of atoms	2409	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	32.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.02% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.375 respectively for untwinned datasets, and 0.333, 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	0.35	0/1489	0.74	2/2019 (0.1%)
2	B	0.26	0/923	0.65	0/1254
All	All	0.32	0/2412	0.71	2/3273 (0.1%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	194	ILE	CG1-CB-CG2	-5.98	98.25	111.40
1	A	47	ARG	NE-CZ-NH1	-5.17	117.72	120.30

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	1455	0	1447	19	0
2	B	912	0	869	5	0
3	A	18	0	0	1	0
3	B	24	0	0	0	0
All	All	2409	0	2316	20	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 4.

All (20) 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:179:ILE:HD11	1:A:192:HIS:H	1.48	0.77
1:A:198:SER:OG	1:A:199:THR:N	2.24	0.70
1:A:179:ILE:HA	1:A:218:ILE:HA	1.87	0.56
2:B:91:LYS:HE2	2:B:97:ASP:OD1	2.08	0.52
1:A:132:PHE:CZ	2:B:46:LEU:HD21	2.45	0.52
1:A:184:PHE:CD1	1:A:214:VAL:HG22	2.46	0.51
1:A:179:ILE:HD11	1:A:192:HIS:O	2.11	0.50
1:A:79:ARG:NH1	3:A:2004:HOH:O	2.36	0.48
1:A:184:PHE:HD1	1:A:214:VAL:HG22	1.78	0.48
1:A:19:SER:HA	2:B:17:ALA:HB2	1.95	0.48
1:A:150:THR:HB	1:A:151:PRO:HD2	1.96	0.47
1:A:146:GLU:O	1:A:148:LYS:HD2	2.18	0.44
1:A:46:SER:C	1:A:47:ARG:HG2	2.38	0.44
1:A:160:TRP:CZ3	1:A:169:ALA:HB2	2.53	0.43
1:A:15:THR:HG23	2:B:18:ARG:HG2	2.01	0.43
1:A:135:ASN:HB3	2:B:145:THR:HA	2.01	0.42
1:A:158:LEU:HD21	1:A:177:MET:HG3	2.02	0.42
1:A:222:GLN:CD	1:A:222:GLN:N	2.73	0.42
1:A:63:VAL:HG13	1:A:80:ILE:HG13	2.02	0.42
1:A:90:ASP:OD1	1:A:90:ASP:N	2.52	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	175/240 (73%)	173 (99%)	2 (1%)	0	100	100
2	B	118/149 (79%)	115 (98%)	3 (2%)	0	100	100
All	All	293/389 (75%)	288 (98%)	5 (2%)	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	155/209 (74%)	147 (95%)	8 (5%)	29	54
2	B	97/121 (80%)	96 (99%)	1 (1%)	82	94
All	All	252/330 (76%)	243 (96%)	9 (4%)	42	70

All (9) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	20	ARG
1	A	63	VAL
1	A	89	ARG
1	A	128	VAL
1	A	148	LYS
1	A	188	SER
1	A	191	SER
1	A	222	GLN
2	B	38	ASP

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
2	B	80	ASN

### 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 carbohydrates 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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	186/240 (77%)	-0.02	0 100 100	19, 33, 47, 57	1 (0%)
2	B	126/149 (84%)	-0.21	0 100 100	18, 30, 46, 54	0
All	All	312/389 (80%)	-0.10	0 100 100	18, 32, 47, 57	1 (0%)

There are no RSRZ outliers to report.

### 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 carbohydrates 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.