Full wwPDB X-ray Structure Validation Report ⓘ

May 24, 2020 – 01:14 am BST

PDB ID	:	5JGE
Title	:	Crystal structure of Atg19 coiled-coil complexed with Ape1 propeptide
Authors	:	Watanabe, Y.; Noda, N.N.
Deposited on	:	2016-04-20
Resolution	:	1.91 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 following versions of software and data (see references ①) were used in the production of this report:

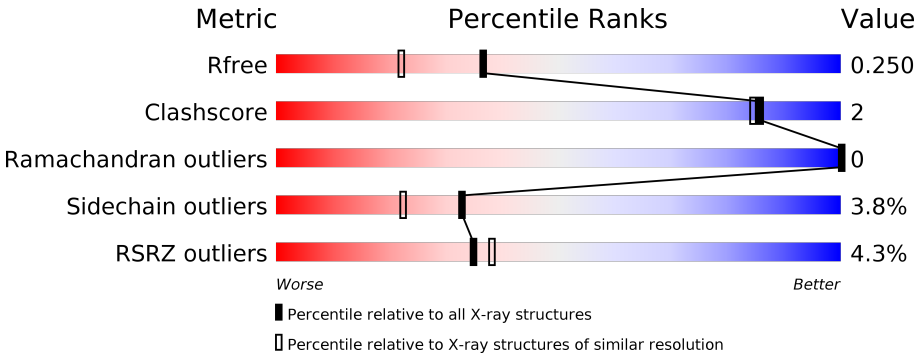
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.11
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

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 1.91 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}	130704	7937 (1.94-1.90)
Clashscore	141614	8644 (1.94-1.90)
Ramachandran outliers	138981	8530 (1.94-1.90)
Sidechain outliers	138945	8530 (1.94-1.90)
RSRZ outliers	127900	7793 (1.94-1.90)

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 >=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	32	3% 72% 13% • 13%
1	B	32	6% 78% 6% 16%
1	D	32	6% 91% • 6%
1	E	32	6% 78% 13% • 6%
2	C	23	96% •
2	F	23	96% •

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 1513 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 Autophagy-related protein 19.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	28	Total	C	N	O	S	0	0	0
			235	149	39	45	2			
1	B	27	Total	C	N	O	S	0	0	0
			224	143	37	42	2			
1	D	30	Total	C	N	O	S	0	0	0
			246	156	41	47	2			
1	E	30	Total	C	N	O	S	0	0	0
			246	156	41	47	2			

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	156	GLY	-	expression tag	UNP P35193
A	157	PRO	-	expression tag	UNP P35193
A	158	HIS	-	expression tag	UNP P35193
A	159	MET	-	expression tag	UNP P35193
B	156	GLY	-	expression tag	UNP P35193
B	157	PRO	-	expression tag	UNP P35193
B	158	HIS	-	expression tag	UNP P35193
B	159	MET	-	expression tag	UNP P35193
D	156	GLY	-	expression tag	UNP P35193
D	157	PRO	-	expression tag	UNP P35193
D	158	HIS	-	expression tag	UNP P35193
D	159	MET	-	expression tag	UNP P35193
E	156	GLY	-	expression tag	UNP P35193
E	157	PRO	-	expression tag	UNP P35193
E	158	HIS	-	expression tag	UNP P35193
E	159	MET	-	expression tag	UNP P35193

- Molecule 2 is a protein called Ape1 propeptide.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	23	Total	C	N	O	S	0	0	0
			193	122	31	38	2			
2	F	23	Total	C	N	O	S	0	0	0
			193	122	31	38	2			

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	22	Total	O	0	0
			22	22		
3	B	26	Total	O	0	0
			26	26		
3	C	34	Total	O	0	0
			34	34		
3	D	28	Total	O	0	0
			28	28		
3	E	27	Total	O	0	0
			27	27		
3	F	39	Total	O	0	0
			39	39		

3 Residue-property plots (i)

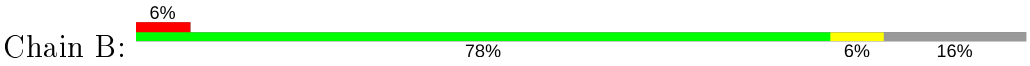
These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are 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.

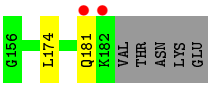
- Molecule 1: Autophagy-related protein 19

Chain A:

- Molecule 1: Autophagy-related protein 19

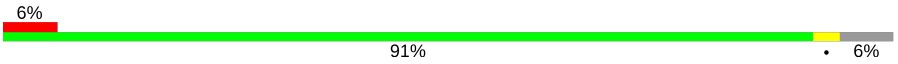
Chain B:

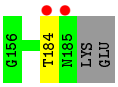




- Molecule 1: Autophagy-related protein 19

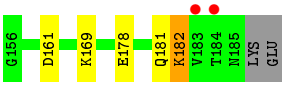
Chain D:





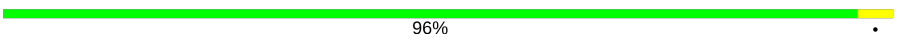
- Molecule 1: Autophagy-related protein 19

Chain E:



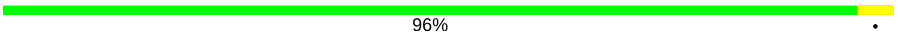
- Molecule 2: Ape1 propeptide

Chain C:



- Molecule 2: Ape1 propeptide

Chain F:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	27.88Å 32.92Å 56.96Å 87.19° 76.52° 67.10°	Depositor
Resolution (Å)	55.33 – 1.91 27.66 – 1.91	Depositor EDS
% Data completeness (in resolution range)	96.5 (55.33-1.91) 96.5 (27.66-1.91)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.94 (at 1.91Å)	Xtriage
Refinement program	REFMAC 5.8.0103	Depositor
R, R_{free}	0.194 , 0.246 0.200 , 0.250	Depositor DCC
R_{free} test set	686 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å^2)	20.6	Xtriage
Anisotropy	0.494	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 44.3	EDS
L-test for twinning[2]	$< \|L\| > = 0.51$, $< L^2 > = 0.35$	Xtriage
Estimated twinning fraction	0.054 for h,h-k,h-l	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	1513	wwPDB-VP
Average B, all atoms (Å^2)	32.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 12.08% 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	0.76	0/236	0.85	0/313
1	B	0.70	0/226	0.72	0/299
1	D	0.66	0/248	0.75	0/330
1	E	0.77	0/248	0.87	2/330 (0.6%)
2	C	0.78	0/194	0.77	0/257
2	F	0.79	0/194	0.82	0/257
All	All	0.74	0/1346	0.80	2/1786 (0.1%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	E	161	ASP	CB-CG-OD1	5.79	123.52	118.30
1	E	161	ASP	CB-CG-OD2	-5.13	113.69	118.30

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	235	0	245	4	0
1	B	224	0	233	2	0
1	D	246	0	255	0	0
1	E	246	0	255	2	0
2	C	193	0	204	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	F	193	0	204	0	0
3	A	22	0	0	1	0
3	B	26	0	0	0	2
3	C	34	0	0	0	1
3	D	28	0	0	0	0
3	E	27	0	0	1	0
3	F	39	0	0	0	1
All	All	1513	0	1396	6	2

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 2.

All (6) 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:180:GLU:OE1	1:B:181:GLN:NE2	2.18	0.77
1:E:169:LYS:NZ	3:E:201:HOH:O	2.23	0.60
1:E:178:GLU:O	1:E:182:LYS:HD2	2.06	0.55
1:A:170:LEU:HD22	1:B:174:LEU:HD12	1.91	0.52
1:A:162:ASN:HB2	3:A:204:HOH:O	2.17	0.43
1:A:164:MET:HG2	2:C:15:LEU:HD11	2.01	0.43

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:B:210:HOH:O	3:F:128:HOH:O[1_455]	2.11	0.09
3:B:201:HOH:O	3:C:101:HOH:O[1_455]	2.15	0.05

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	26/32 (81%)	26 (100%)	0	0	100	100
1	B	25/32 (78%)	25 (100%)	0	0	100	100
1	D	28/32 (88%)	28 (100%)	0	0	100	100
1	E	28/32 (88%)	28 (100%)	0	0	100	100
2	C	21/23 (91%)	21 (100%)	0	0	100	100
2	F	21/23 (91%)	21 (100%)	0	0	100	100
All	All	149/174 (86%)	149 (100%)	0	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	28/31 (90%)	26 (93%)	2 (7%)	14	6
1	B	26/31 (84%)	26 (100%)	0	100	100
1	D	29/31 (94%)	28 (97%)	1 (3%)	37	27
1	E	29/31 (94%)	27 (93%)	2 (7%)	15	6
2	C	22/22 (100%)	22 (100%)	0	100	100
2	F	22/22 (100%)	21 (96%)	1 (4%)	27	17
All	All	156/168 (93%)	150 (96%)	6 (4%)	33	22

All (6) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	180	GLU
1	A	184	THR
1	D	184	THR
1	E	181	GLN
1	E	182	LYS
2	F	15	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	D	162	ASN
1	D	166	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 carbohydrates in this entry.

5.6 Ligand geometry

There are no ligands in this entry.

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

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	28/32 (87%)	0.23	1 (3%) 42 46	25, 32, 64, 72	0
1	B	27/32 (84%)	0.30	2 (7%) 14 16	19, 29, 58, 81	0
1	D	30/32 (93%)	-0.02	2 (6%) 17 20	24, 31, 60, 74	0
1	E	30/32 (93%)	0.03	2 (6%) 17 20	18, 25, 48, 64	0
2	C	23/23 (100%)	-0.09	0 100 100	20, 27, 34, 37	0
2	F	23/23 (100%)	-0.02	0 100 100	20, 24, 33, 34	0
All	All	161/174 (92%)	0.08	7 (4%) 35 38	18, 29, 60, 81	0

All (7) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	181	GLN	5.5
1	E	184	THR	4.7
1	E	183	VAL	3.9
1	B	182	LYS	3.4
1	D	184	THR	3.3
1	A	184	THR	2.5
1	D	185	ASN	2.1

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

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

6.3 Carbohydrates

There are no carbohydrates in this entry.

6.4 Ligands

There are no ligands in this entry.

6.5 Other polymers

There are no such residues in this entry.