



Full wwPDB X-ray Structure Validation Report ⓘ

May 14, 2020 – 09:09 am BST

PDB ID : 6AGH
Title : Crystal structure of EFHA1 in Apo-State
Authors : Yangfei, X.; Xue, Y.; Yuequan, S.
Deposited on : 2018-08-11
Resolution : 2.74 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 ⓘ](#)) 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

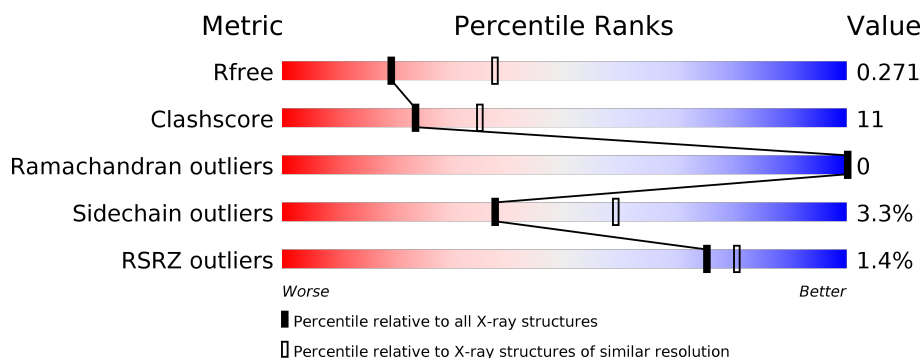
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.74 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	1271 (2.76-2.72)
Clashscore	141614	1322 (2.76-2.72)
Ramachandran outliers	138981	1297 (2.76-2.72)
Sidechain outliers	138945	1298 (2.76-2.72)
RSRZ outliers	127900	1243 (2.76-2.72)

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 $\leq 5\%$. 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	339	<div> <div> <div></div> <div>60%</div> <div>22%</div> <div>17%</div> </div> <div> <div></div> <div>60%</div> <div>22%</div> <div>17%</div> </div> </div>
1	B	339	<div> <div> <div></div> <div>63%</div> <div>18%</div> <div>19%</div> </div> <div> <div></div> <div>63%</div> <div>18%</div> <div>19%</div> </div> </div>

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 4544 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 Calcium uptake protein 2, mitochondrial.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	281	Total	C	N	O	S	0	0	0
			2302	1488	384	415	15			
1	B	274	Total	C	N	O	S	0	0	0
			2228	1448	366	400	14			

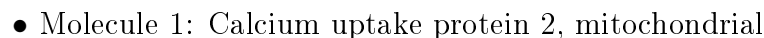
There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	60	GLY	-	expression tag	UNP Q8IYU8
A	61	SER	-	expression tag	UNP Q8IYU8
B	60	GLY	-	expression tag	UNP Q8IYU8
B	61	SER	-	expression tag	UNP Q8IYU8

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	6	Total	O	0	0
			6	6		
2	B	8	Total	O	0	0
			8	8		

- Molecule 1: Calcium uptake protein 2, mitochondrial



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	44.71Å 63.20Å 66.11Å 92.36° 101.75° 96.74°	Depositor
Resolution (Å)	38.04 – 2.74 38.04 – 2.74	Depositor EDS
% Data completeness (in resolution range)	96.3 (38.04-2.74) 91.8 (38.04-2.74)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.09	Depositor
$\langle I/\sigma(I) \rangle$ ¹	5.18 (at 2.72Å)	Xtriage
Refinement program	PHENIX (dev_2666: ???)	Depositor
R, R_{free}	0.213 , 0.272 0.215 , 0.271	Depositor DCC
R_{free} test set	1768 reflections (9.96%)	wwPDB-VP
Wilson B-factor (Å ²)	60.4	Xtriage
Anisotropy	0.384	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 49.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	4544	wwPDB-VP
Average B, all atoms (Å ²)	75.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 9.67% 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	0.35	0/2349	0.52	0/3139
1	B	0.41	0/2271	0.54	1/3034 (0.0%)
All	All	0.38	0/4620	0.53	1/6173 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	360	GLN	CA-CB-CG	-7.89	96.04	113.40

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	2302	0	2257	58	0
1	B	2228	0	2167	45	0
2	A	6	0	0	0	0
2	B	8	0	0	1	0
All	All	4544	0	4424	100	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 (100) 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:98:HIS:CE1	1:A:99:GLU:HG2	1.70	1.24
1:A:98:HIS:CE1	1:A:99:GLU:CG	2.45	1.00
1:A:98:HIS:ND1	1:A:99:GLU:HG2	1.77	0.98
1:B:303:VAL:HG23	1:B:307:LEU:HD13	1.55	0.89
1:B:362:LEU:HD23	1:B:367:LEU:HD11	1.58	0.84
1:B:298:ILE:O	1:B:302:ASN:ND2	2.17	0.77
1:B:362:LEU:HD23	1:B:367:LEU:CD1	2.17	0.74
1:B:362:LEU:HD23	1:B:367:LEU:HD21	1.70	0.74
1:B:304:ARG:HG2	1:B:305:GLU:HG3	1.76	0.68
1:A:327:HIS:HB2	1:A:358:THR:HG22	1.77	0.67
1:A:363:SER:O	1:A:367:LEU:HD22	1.94	0.67
1:B:362:LEU:HD23	1:B:367:LEU:CD2	2.26	0.65
1:A:240:GLY:HA3	1:A:244:GLN:HG2	1.81	0.62
1:A:105:THR:HG22	1:A:106:PRO:HD2	1.82	0.61
1:A:84:SER:O	1:A:88:GLN:HG2	2.00	0.61
1:A:191:MET:HG2	1:A:248:HIS:HA	1.83	0.60
1:A:325:THR:O	1:A:328:LEU:HD13	2.01	0.60
1:B:281:GLU:N	1:B:281:GLU:OE1	2.35	0.58
1:A:98:HIS:CE1	1:A:99:GLU:HG3	2.39	0.58
1:A:98:HIS:O	1:A:99:GLU:HB2	2.03	0.57
1:A:275:LEU:HD22	1:B:150:ARG:HG2	1.85	0.57
1:B:362:LEU:CD2	1:B:367:LEU:HD21	2.35	0.57
1:A:240:GLY:HA3	1:A:244:GLN:CG	2.35	0.57
1:B:308:SER:O	1:B:310:GLY:N	2.38	0.56
1:A:98:HIS:HE1	1:A:99:GLU:CG	2.16	0.56
1:B:338:PHE:CZ	1:B:349:GLU:HB3	2.42	0.55
1:B:362:LEU:HG	1:B:367:LEU:CD2	2.37	0.54
1:A:279:ARG:HD3	1:B:107:ARG:HD2	1.90	0.54
1:A:98:HIS:HB2	1:A:127:LEU:HB3	1.90	0.54
1:A:98:HIS:ND1	1:A:99:GLU:CG	2.59	0.53
1:B:362:LEU:CG	1:B:367:LEU:HD21	2.38	0.53
1:A:169:ILE:HD13	1:A:256:MET:HG2	1.90	0.53
1:A:162:GLU:OE1	1:A:232:THR:OG1	2.24	0.53
1:B:362:LEU:CD2	1:B:367:LEU:CD2	2.86	0.53
1:A:300:TRP:O	1:A:304:ARG:HB2	2.11	0.51
1:B:97:GLU:OE2	1:B:98:HIS:N	2.43	0.51
1:A:107:ARG:HD2	1:B:279:ARG:HD3	1.93	0.50
1:A:382:LEU:HD23	1:A:384:HIS:HB3	1.94	0.49
1:B:362:LEU:HG	1:B:367:LEU:HD22	1.94	0.49
1:A:350:PHE:O	1:A:354:VAL:HG23	2.12	0.49
1:B:362:LEU:CD2	1:B:367:LEU:CD1	2.90	0.49
1:A:90:PHE:CE1	1:A:104:MET:HG3	2.47	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:324:PHE:CD1	1:B:354:VAL:HG23	2.48	0.48
1:A:129:LYS:HA	1:A:132:ILE:HG12	1.94	0.48
1:A:325:THR:HA	1:A:328:LEU:CD1	2.43	0.48
1:A:129:LYS:O	1:A:132:ILE:HG13	2.12	0.48
1:B:362:LEU:CD2	1:B:367:LEU:HD11	2.38	0.48
1:B:136:LEU:O	1:B:140:GLN:HG3	2.13	0.48
1:B:135:THR:OG1	1:B:157:LEU:HD12	2.14	0.48
1:B:98:HIS:O	1:B:99:GLU:HB3	2.14	0.48
1:A:162:GLU:HB3	1:A:234:LEU:HD12	1.95	0.47
1:B:110:LEU:O	1:B:114:MET:HG2	2.14	0.47
1:A:89:ARG:HH21	1:A:116:GLU:HA	1.80	0.47
1:A:105:THR:HG21	1:A:154:ASP:HA	1.97	0.47
1:A:331:PHE:HD2	1:A:388:LEU:HD21	1.79	0.47
1:A:322:CYS:O	1:A:325:THR:OG1	2.29	0.47
1:A:97:GLU:HG2	1:A:98:HIS:N	2.29	0.47
1:A:362:LEU:HB3	1:A:367:LEU:HD21	1.97	0.47
1:A:98:HIS:HE1	1:A:99:GLU:HG3	1.79	0.47
1:A:197:PHE:O	1:A:201:GLN:HG3	2.15	0.46
1:B:197:PHE:O	1:B:201:GLN:HG3	2.15	0.46
1:B:362:LEU:CG	1:B:367:LEU:CD2	2.94	0.46
1:A:303:VAL:HG13	1:A:307:LEU:HD23	1.96	0.46
1:A:194:LYS:HA	1:A:239:PHE:CZ	2.51	0.46
1:A:328:LEU:HD21	1:A:391:LEU:HB3	1.97	0.46
1:A:88:GLN:O	1:A:92:GLN:HG3	2.16	0.46
1:A:170:LEU:HD21	1:A:259:LEU:HG	1.98	0.45
1:B:125:LYS:HD3	1:B:125:LYS:N	2.32	0.45
1:A:197:PHE:CD2	1:A:239:PHE:HE2	2.34	0.45
1:B:189:ASN:O	1:B:190:GLU:HB2	2.17	0.45
1:A:325:THR:HA	1:A:328:LEU:HD13	1.99	0.44
1:B:303:VAL:HA	1:B:307:LEU:HB2	1.99	0.44
1:B:331:PHE:HD2	1:B:388:LEU:HD21	1.81	0.44
1:A:105:THR:CG2	1:A:154:ASP:HA	2.48	0.44
1:B:280:LYS:HB2	1:B:307:LEU:HD21	2.00	0.43
1:B:328:LEU:HA	1:B:328:LEU:HD23	1.84	0.43
1:A:345:VAL:HG11	1:A:384:HIS:ND1	2.34	0.43
1:B:89:ARG:NH2	1:B:115:PHE:O	2.51	0.43
1:A:314:SER:HB3	1:A:317:GLU:OE1	2.18	0.43
1:B:306:LYS:O	1:B:372:LYS:HD3	2.18	0.43
1:A:371:PHE:CE2	1:A:382:LEU:HB2	2.54	0.42
1:A:98:HIS:C	1:A:98:HIS:ND1	2.72	0.42
1:A:134:ASP:O	1:A:155:LYS:HB3	2.20	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:103:TYR:CE2	1:A:230:ILE:HD11	2.55	0.42
1:A:193:GLU:HG3	1:A:246:LYS:HE3	2.02	0.42
1:B:300:TRP:HA	1:B:303:VAL:HG12	2.02	0.41
1:B:137:SER:O	1:B:141:THR:HG22	2.20	0.41
1:B:359:GLY:O	1:B:360:GLN:HG2	2.21	0.41
1:A:331:PHE:CD2	1:A:388:LEU:HD21	2.56	0.41
1:B:307:LEU:C	1:B:307:LEU:HD23	2.41	0.41
1:A:291:THR:HB	1:A:296:LYS:HG3	2.02	0.41
1:A:97:GLU:OE1	1:A:126:LYS:HG2	2.20	0.41
1:B:180:ALA:O	1:B:184:LEU:HG	2.19	0.41
1:B:295:ASN:O	1:B:298:ILE:HG22	2.20	0.41
1:A:238:PHE:HB3	1:A:247:LEU:HD22	2.02	0.41
1:A:159:SER:OG	1:A:162:GLU:HG3	2.21	0.41
1:A:199:LYS:O	1:A:203:ILE:HG13	2.20	0.41
1:B:129:LYS:O	1:B:133:GLU:HG2	2.20	0.41
1:B:327:HIS:HB2	1:B:358:THR:HG22	2.03	0.41
1:B:240:GLY:O	2:B:401:HOH:O	2.22	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	273/339 (80%)	269 (98%)	4 (2%)	0	100	100
1	B	262/339 (77%)	259 (99%)	3 (1%)	0	100	100
All	All	535/678 (79%)	528 (99%)	7 (1%)	0	100	100

There are no Ramachandran outliers to report.

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	247/306 (81%)	239 (97%)	8 (3%)	39	59
1	B	234/306 (76%)	226 (97%)	8 (3%)	37	58
All	All	481/612 (79%)	465 (97%)	16 (3%)	38	59

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	187	ASP
1	A	237	ARG
1	A	250	LYS
1	A	314	SER
1	A	363	SER
1	A	371	PHE
1	A	392	LYS
1	A	393	ASN
1	B	112	SER
1	B	130	LYS
1	B	195	ARG
1	B	237	ARG
1	B	242	ARG
1	B	339	SER
1	B	371	PHE
1	B	393	ASN

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

5.3.3 RNA ⓘ

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, 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	281/339 (82%)	0.21	2 (0%) 87 90	40, 75, 106, 120	0
1	B	274/339 (80%)	0.22	6 (2%) 62 69	47, 76, 101, 128	0
All	All	555/678 (81%)	0.21	8 (1%) 75 80	40, 75, 104, 128	0

All (8) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	360	GLN	3.0
1	B	127	LEU	2.7
1	B	199	LYS	2.5
1	B	347	LEU	2.5
1	A	164	LEU	2.4
1	A	347	LEU	2.2
1	B	359	GLY	2.1
1	B	203	ILE	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 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.