



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 02:10 AM GMT

PDB ID : 2FXK
Title : Crystal structure of the macro-domain of human core histone variant macroH2A1.1 (form A)
Authors : Kustatscher, G.; Hothorn, M.; Pugieux, C.; Scheffzek, K.; Ladurner, A.G.
Deposited on : 2006-02-06
Resolution : 2.54 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
<http://wwpdb.org/validation/2016/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
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

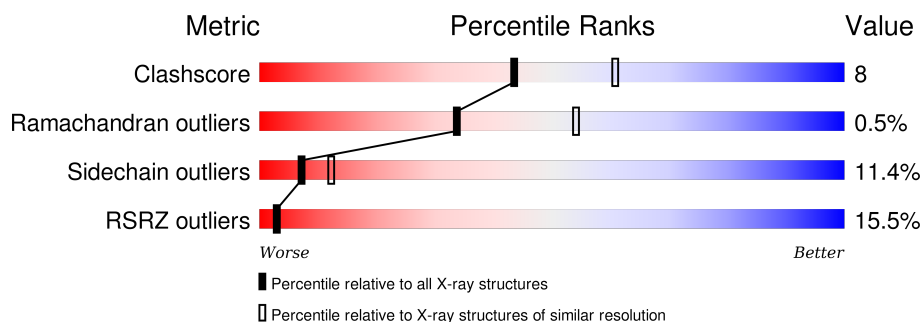
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.54 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))
Clashscore	102246	5292 (2.58-2.50)
Ramachandran outliers	100387	5194 (2.58-2.50)
Sidechain outliers	100360	5196 (2.58-2.50)
RSRZ outliers	91569	4561 (2.58-2.50)

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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 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	211	
1	B	211	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 2853 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 H2A histone family, member Y isoform 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	187	Total	C	N	O	S	0	0	0
			1405	901	230	269	5			
1	B	187	Total	C	N	O	S	0	0	0
			1405	901	230	269	5			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	159	GLY	-	CLONING ARTIFACT	GB 20336746
A	160	ALA	-	CLONING ARTIFACT	GB 20336746
A	161	MET	-	CLONING ARTIFACT	GB 20336746
B	159	GLY	-	CLONING ARTIFACT	GB 20336746
B	160	ALA	-	CLONING ARTIFACT	GB 20336746
B	161	MET	-	CLONING ARTIFACT	GB 20336746

- Molecule 2 is water.

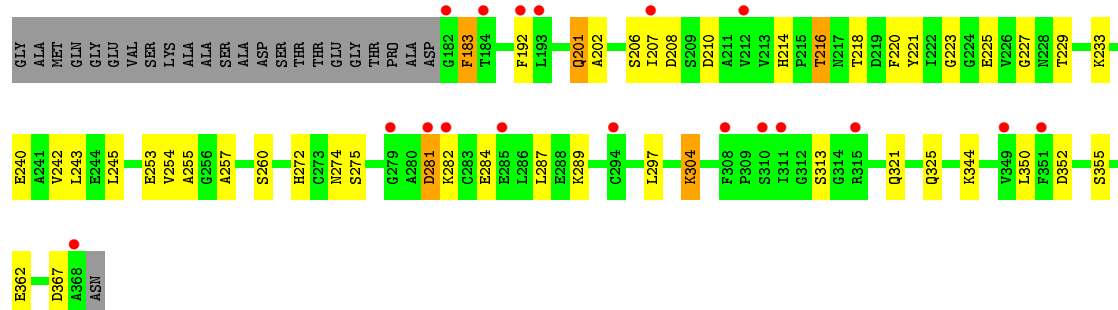
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	21	Total	O	0	0
			21	21		
2	B	22	Total	O	0	0
			22	22		

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 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.

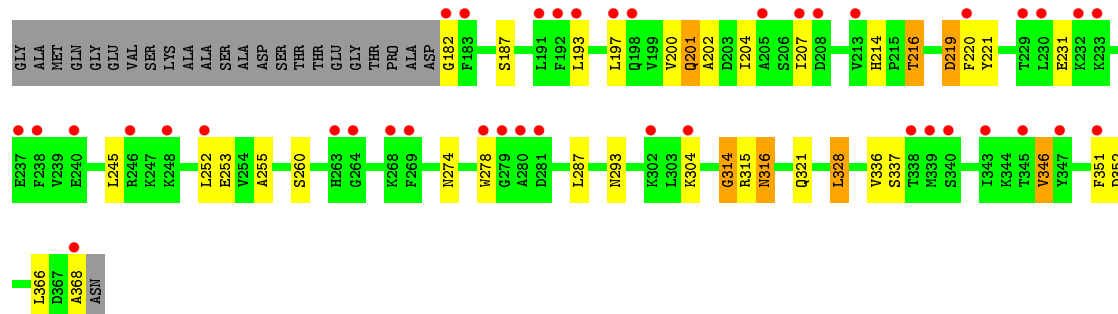
- Molecule 1: H2A histone family, member Y isoform 1

Chain A: 



- Molecule 1: H2A histone family, member Y isoform 1

Chain B: 



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α , β , γ	90.77Å 98.27Å 42.05Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	90.91 – 2.54 98.27 – 2.54	Depositor EDS
% Data completeness (in resolution range)	99.0 (90.91-2.54) 99.0 (98.27-2.54)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.08	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.28 (at 2.55Å)	Xtriage
Refinement program	REFMAC 5.2.0005	Depositor
R, R_{free}	0.207 , 0.270 0.271 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	DCC
Wilson B-factor (Å ²)	61.5	Xtriage
Anisotropy	0.333	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 41.8	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Outliers	0 of 12857 reflections	Xtriage
F_o, F_c correlation	0.90	EDS
Total number of atoms	2853	wwPDB-VP
Average B, all atoms (Å ²)	59.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.05% 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, 0.375 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	0.73	0/1429	0.79	0/1929
1	B	0.61	0/1429	0.71	1/1929 (0.1%)
All	All	0.67	0/2858	0.75	1/3858 (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	352	ASP	CB-CG-OD1	-5.06	113.75	118.30

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	1405	0	1435	25	0
1	B	1405	0	1435	21	0
2	A	21	0	0	0	0
2	B	22	0	0	6	0
All	All	2853	0	2870	46	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 8.

All (46) 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:B:216:THR:HG22	1:B:221:TYR:O	1.99	0.63
1:A:325:GLN:CG	1:A:362:GLU:OE1	2.48	0.62
1:B:368:ALA:HB1	2:B:42:HOH:O	1.99	0.61
1:A:183:PHE:C	1:A:183:PHE:CD2	2.75	0.60
1:A:210:ASP:OD2	1:A:304:LYS:HG2	2.02	0.59
1:A:183:PHE:C	1:A:183:PHE:HD2	2.05	0.59
1:B:214:HIS:CE1	1:B:216:THR:HG23	2.38	0.59
1:A:214:HIS:CE1	1:A:216:THR:HG23	2.37	0.58
1:A:216:THR:CG2	1:A:221:TYR:O	2.51	0.58
1:A:216:THR:HG22	1:A:221:TYR:O	2.02	0.58
1:B:202:ALA:HB3	1:B:207:ILE:HD11	1.84	0.58
1:B:314:GLY:HA3	2:B:43:HOH:O	2.04	0.57
1:A:202:ALA:CB	1:A:207:ILE:HD11	2.35	0.57
1:A:321:GLN:OE1	1:A:325:GLN:NE2	2.37	0.56
1:B:202:ALA:CB	1:B:207:ILE:HD11	2.36	0.56
1:A:325:GLN:HG3	1:A:362:GLU:OE1	2.06	0.56
1:B:351:PHE:CE2	2:B:3:HOH:O	2.59	0.55
1:A:223:GLY:O	1:A:227:GLY:HA3	2.07	0.55
1:A:206:SER:HB3	1:A:233:LYS:HZ1	1.73	0.54
1:A:216:THR:HG21	1:A:220:PHE:HA	1.89	0.53
1:A:352:ASP:OD1	1:A:355:SER:OG	2.22	0.52
1:B:197:LEU:HD12	1:B:346:VAL:HG13	1.91	0.52
1:B:216:THR:CG2	1:B:221:TYR:O	2.59	0.50
1:A:202:ALA:HB3	1:A:207:ILE:HD11	1.94	0.49
1:B:182:GLY:N	2:B:16:HOH:O	2.44	0.49
1:A:254:VAL:O	1:A:255:ALA:HB3	2.13	0.48
1:B:328:LEU:HG	1:B:366:LEU:HD11	1.97	0.47
1:A:218:THR:HG22	1:A:274:ASN:ND2	2.31	0.46
1:B:216:THR:HG21	1:B:220:PHE:HA	1.98	0.46
1:A:245:LEU:HD22	1:A:260:SER:HB3	1.97	0.45
1:A:257:ALA:HA	1:A:272:HIS:O	2.16	0.45
1:B:316:ASN:HD22	1:B:316:ASN:N	2.13	0.45
1:A:281:ASP:O	1:A:282:LYS:C	2.54	0.44
1:B:255:ALA:O	1:B:293:ASN:ND2	2.46	0.44
1:A:242:VAL:HG22	1:A:272:HIS:CE1	2.52	0.43
1:B:252:LEU:HD23	1:B:274:ASN:HB2	2.01	0.43
1:B:201:GLN:O	1:B:202:ALA:HB2	2.19	0.43
1:A:201:GLN:HG2	1:A:350:LEU:O	2.18	0.42
1:A:206:SER:HB3	1:A:233:LYS:NZ	2.35	0.42
1:B:245:LEU:HD22	1:B:260:SER:HB3	2.02	0.42
1:A:223:GLY:O	1:A:227:GLY:CA	2.68	0.41
1:B:351:PHE:CZ	2:B:3:HOH:O	2.57	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:192:PHE:CZ	1:A:367:ASP:HB3	2.55	0.41
1:B:316:ASN:ND2	2:B:23:HOH:O	2.53	0.41
1:B:200:VAL:HG12	1:B:201:GLN:N	2.35	0.40
1:B:219:ASP:O	1:B:220:PHE:C	2.58	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	185/211 (88%)	175 (95%)	9 (5%)	1 (0%)	34	54
1	B	185/211 (88%)	172 (93%)	12 (6%)	1 (0%)	34	54
All	All	370/422 (88%)	347 (94%)	21 (6%)	2 (0%)	34	54

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	208	ASP
1	B	314	GLY

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.

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	153/169 (90%)	136 (89%)	17 (11%)	8	13
1	B	153/169 (90%)	135 (88%)	18 (12%)	6	11
All	All	306/338 (90%)	271 (89%)	35 (11%)	7	12

All (35) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	183	PHE
1	A	201	GLN
1	A	216	THR
1	A	225	GLU
1	A	229	THR
1	A	240	GLU
1	A	243	LEU
1	A	253	GLU
1	A	275	SER
1	A	281	ASP
1	A	284	GLU
1	A	287	LEU
1	A	289	LYS
1	A	297	LEU
1	A	304	LYS
1	A	313	SER
1	A	344	LYS
1	B	187	SER
1	B	193	LEU
1	B	201	GLN
1	B	204	ILE
1	B	216	THR
1	B	219	ASP
1	B	231	GLU
1	B	253	GLU
1	B	278	TRP
1	B	287	LEU
1	B	304	LYS
1	B	315	ARG
1	B	316	ASN
1	B	321	GLN
1	B	328	LEU

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Mol	Chain	Res	Type
1	B	336	VAL
1	B	337	SER
1	B	346	VAL

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	325	GLN
1	B	316	ASN
1	B	361	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, 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	187/211 (88%)	0.94	18 (9%) 10 11	53, 60, 69, 78	0
1	B	187/211 (88%)	1.33	40 (21%) 1 1	50, 58, 65, 68	0
All	All	374/422 (88%)	1.14	58 (15%) 3 3	50, 59, 67, 78	0

All (58) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	182	GLY	6.1
1	B	192	PHE	5.9
1	B	351	PHE	5.8
1	B	182	GLY	4.9
1	B	240	GLU	4.8
1	B	340	SER	4.6
1	B	279	GLY	4.5
1	B	302	LYS	4.2
1	B	347	TYR	4.0
1	B	191	LEU	3.9
1	B	233	LYS	3.9
1	B	281	ASP	3.8
1	B	368	ALA	3.8
1	B	304	LYS	3.5
1	B	339	MET	3.5
1	B	268	LYS	3.5
1	B	269	PHE	3.5
1	B	237	GLU	3.4
1	B	193	LEU	3.3
1	B	246	ARG	3.2
1	B	198	GLN	3.2
1	A	279	GLY	3.1
1	A	315	ARG	3.0
1	B	220	PHE	3.0

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Mol	Chain	Res	Type	RSRZ
1	B	252	LEU	3.0
1	B	280	ALA	2.9
1	A	294	CYS	2.7
1	A	207	ILE	2.6
1	B	263	HIS	2.6
1	A	349	VAL	2.6
1	B	230	LEU	2.6
1	B	205	ALA	2.5
1	B	197	LEU	2.5
1	A	351	PHE	2.5
1	A	193	LEU	2.5
1	B	229	THR	2.5
1	A	285	GLU	2.5
1	A	212	VAL	2.4
1	A	282	LYS	2.3
1	B	264	GLY	2.3
1	A	311	ILE	2.3
1	B	208	ASP	2.3
1	B	213	VAL	2.3
1	A	192	PHE	2.3
1	A	368	ALA	2.2
1	B	183	PHE	2.2
1	B	207	ILE	2.2
1	A	308	PHE	2.2
1	B	343	ILE	2.2
1	B	345	THR	2.2
1	B	232	LYS	2.1
1	B	278	TRP	2.1
1	B	338	THR	2.1
1	A	281	ASP	2.1
1	A	310	SER	2.0
1	B	238	PHE	2.0
1	A	184	THR	2.0
1	B	248	LYS	2.0

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 [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.