



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 13, 2017 – 07:47 am GMT

PDB ID : 4PBZ  
Title : Structure of the human RbAp48-MTA1(670-695) complex  
Authors : Murthy, A.; Pei, X.Y.; Watson, A.A.; Silva, A.P.G.; Mackay, J.P.; Laue, E.D.  
Deposited on : 2014-04-14  
Resolution : 2.15 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  
Xtriage (Phenix) : 1.9-1692  
EDS : trunk28620  
Percentile statistics : 20161228.v01 (using entries in the PDB archive December 28th 2016)  
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) : recalc28949

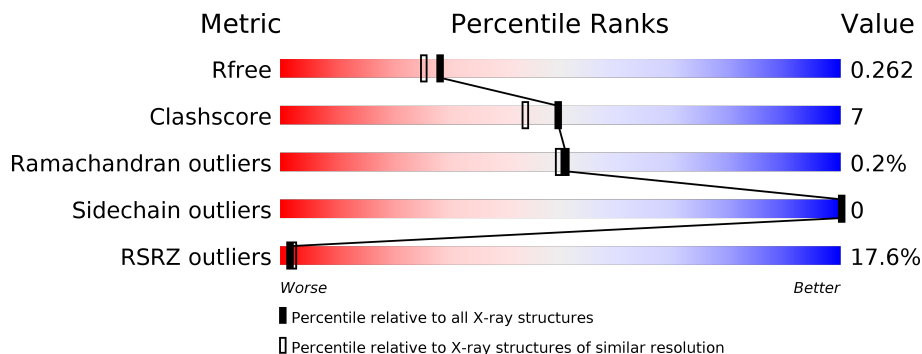
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.15 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))
$R_{free}$	100719	1170 (2.16-2.16)
Clashscore	112137	1278 (2.16-2.16)
Ramachandran outliers	110173	1256 (2.16-2.16)
Sidechain outliers	110143	1255 (2.16-2.16)
RSRZ outliers	101464	1175 (2.16-2.16)

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	425	<div> <div>15%</div> <div>79%</div> <div>12%</div> <div>9%</div> </div>
2	B	26	<div> <div>31%</div> <div>65%</div> <div>19%</div> <div>15%</div> </div>

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 3378 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 Histone-binding protein RBBP4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	386	Total	C	N	O	S	0	0	0
			3081	1943	525	603	10			

- Molecule 2 is a protein called Metastasis-associated protein MTA1.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	B	22	Total	C	N	O	0	0	0
			178	112	37	29			

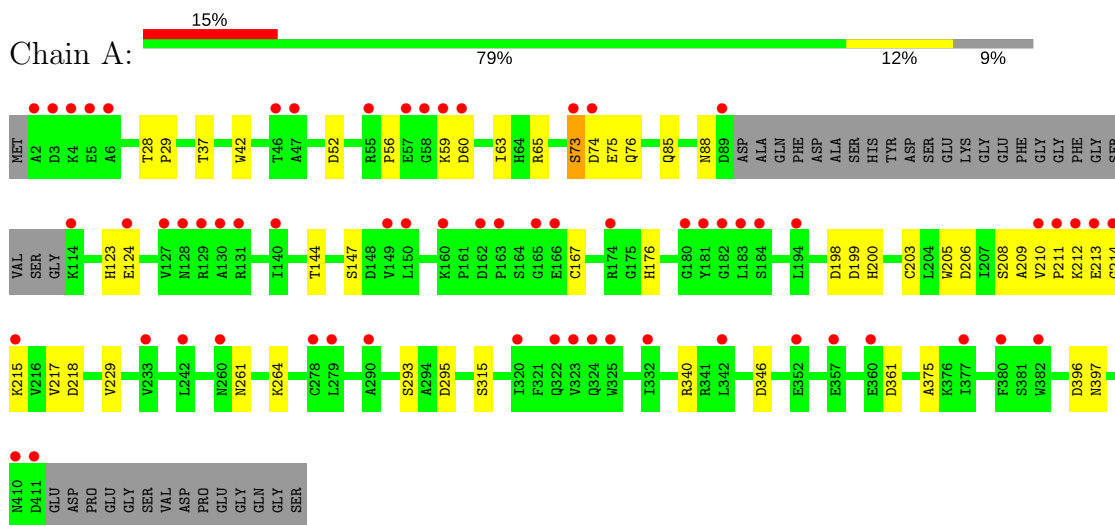
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	116	Total	O	0	0
			116	116		
3	B	3	Total	O	0	0
			3	3		

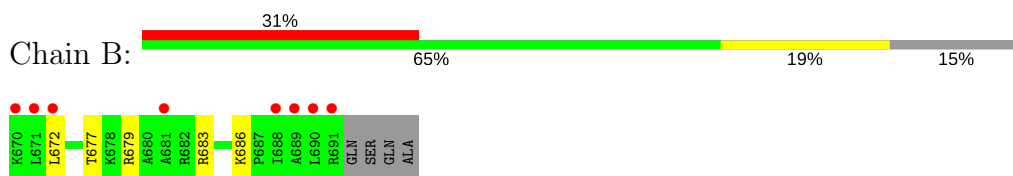
### 3 Residue-property plots [i](#)

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: Histone-binding protein RBBP4



#### ● Molecule 2: Metastasis-associated protein MTA1



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	61.80Å 59.82Å 68.07Å 90.00° 99.19° 90.00°	Depositor
Resolution (Å)	20.00 – 2.15 33.60 – 2.15	Depositor EDS
% Data completeness (in resolution range)	97.1 (20.00-2.15) 97.2 (33.60-2.15)	Depositor EDS
$R_{merge}$	0.06	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.28 (at 2.16Å)	Xtriage
Refinement program	REFMAC 5.8.0049	Depositor
R, $R_{free}$	0.186 , 0.231 0.227 , 0.262	Depositor DCC
$R_{free}$ test set	1328 reflections (5.09%)	DCC
Wilson B-factor (Å <sup>2</sup> )	40.2	Xtriage
Anisotropy	0.677	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 47.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	3378	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	61.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.77% 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, 0.333 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	0.68	0/3165	0.75	1/4315 (0.0%)
2	B	0.56	0/180	0.84	0/239
All	All	0.67	0/3345	0.76	1/4554 (0.0%)

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	A	0	1

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed( $^{\circ}$ )	Ideal( $^{\circ}$ )
1	A	346	ASP	CB-CG-OD1	5.85	123.56	118.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	73	SER	Peptide

### 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	3081	0	2933	39	1
2	B	178	0	200	6	0
3	A	116	0	0	1	0
3	B	3	0	0	0	0
All	All	3378	0	3133	43	1

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.

All (43) 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:42:TRP:HZ2	1:A:75:GLU:OE1	1.50	0.92
1:A:42:TRP:CZ2	1:A:75:GLU:OE1	2.25	0.89
1:A:211:PRO:HG2	1:A:214:GLY:H	1.45	0.81
2:B:672:LEU:CD2	2:B:677:THR:OG1	2.33	0.75
1:A:213:GLU:HB3	1:A:215:LYS:HE3	1.73	0.70
1:A:361:ASP:OD2	2:B:683:ARG:NH1	2.25	0.70
1:A:211:PRO:HG2	1:A:214:GLY:N	2.09	0.68
2:B:672:LEU:HD21	2:B:677:THR:OG1	1.98	0.62
1:A:63:ILE:HD13	1:A:85:GLN:HG2	1.83	0.60
1:A:73:SER:O	1:A:74:ASP:CG	2.40	0.60
1:A:60:ASP:O	1:A:88:ASN:HB2	2.02	0.59
1:A:73:SER:O	1:A:74:ASP:OD1	2.20	0.58
1:A:52:ASP:CG	1:A:65:ARG:HH21	2.09	0.56
1:A:211:PRO:HG2	1:A:214:GLY:CA	2.36	0.55
1:A:75:GLU:HG2	1:A:76:GLN:H	1.73	0.54
1:A:76:GLN:HA	1:A:76:GLN:OE1	2.07	0.54
1:A:211:PRO:HG2	1:A:214:GLY:HA3	1.89	0.53
1:A:37:THR:HG21	3:A:595:HOH:O	2.08	0.52
1:A:210:VAL:HG12	1:A:211:PRO:O	2.10	0.51
1:A:75:GLU:HG2	1:A:76:GLN:N	2.26	0.51
1:A:60:ASP:C	1:A:88:ASN:HB2	2.31	0.50
1:A:124:GLU:HG3	1:A:167:CYS:HB3	1.91	0.50
2:B:679:ARG:HD2	2:B:683:ARG:HH22	1.76	0.49
1:A:217:VAL:HG12	1:A:218:ASP:N	2.27	0.49
1:A:56:PRO:HB2	1:A:59:LYS:HD2	1.94	0.48
1:A:340:ARG:HG2	1:A:375:ALA:C	2.34	0.48
1:A:203:CYS:HB2	1:A:205:TRP:CH2	2.51	0.46
1:A:293:SER:HB3	1:A:295:ASP:OD1	2.16	0.46
1:A:123:HIS:CE1	1:A:144:THR:HG22	2.51	0.45
1:A:199:ASP:C	1:A:200:HIS:CD2	2.90	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:683:ARG:HE	2:B:686:LYS:HD3	1.81	0.45
1:A:147:SER:HB2	1:A:176:HIS:O	2.18	0.44
1:A:200:HIS:N	1:A:200:HIS:CD2	2.86	0.43
1:A:212:LYS:O	1:A:213:GLU:HG3	2.19	0.43
1:A:206:ASP:OD1	1:A:208:SER:HB3	2.19	0.42
1:A:198:ASP:HA	1:A:229:VAL:HG13	2.02	0.42
1:A:396:ASP:O	1:A:397:ASN:HB2	2.20	0.42
1:A:199:ASP:O	1:A:200:HIS:HB2	2.20	0.42
1:A:28:THR:N	1:A:29:PRO:CD	2.83	0.41
1:A:361:ASP:OD1	2:B:683:ARG:HD3	2.20	0.41
1:A:63:ILE:CD1	1:A:85:GLN:HG2	2.49	0.41
1:A:261:ASN:ND2	1:A:264:LYS:HB3	2.36	0.41
1:A:199:ASP:O	1:A:200:HIS:CB	2.69	0.40

All (1) 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)
1:A:74:ASP:OD2	1:A:209:ALA:CA[2_545]	2.19	0.01

## 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	382/425 (90%)	365 (96%)	16 (4%)	1 (0%)	44	41
2	B	20/26 (77%)	20 (100%)	0	0	100	100
All	All	402/451 (89%)	385 (96%)	16 (4%)	1 (0%)	51	50

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	315	SER

### 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	346/375 (92%)	346 (100%)	0	100	100
2	B	19/22 (86%)	19 (100%)	0	100	100
All	All	365/397 (92%)	365 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

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

Mol	Chain	Res	Type
1	A	200	HIS

### 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

### 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<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	386/425 (90%)	0.82	64 (16%) <b>2</b> <b>3</b>	27, 56, 106, 148	1 (0%)
2	B	22/26 (84%)	1.57	8 (36%) <b>0</b> <b>1</b>	43, 70, 104, 128	0
All	All	408/451 (90%)	0.86	72 (17%) <b>2</b> <b>2</b>	27, 57, 107, 148	1 (0%)

All (72) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	183	LEU	6.1
1	A	210	VAL	6.1
1	A	214	GLY	5.8
2	B	670	LYS	5.6
1	A	3	ASP	5.3
1	A	213	GLU	5.1
1	A	165	GLY	5.0
1	A	342	LEU	4.7
2	B	681	ALA	4.2
1	A	5	GLU	4.2
2	B	689	ALA	4.1
1	A	212	LYS	4.0
1	A	211	PRO	4.0
1	A	260	ASN	4.0
1	A	215	LYS	3.9
1	A	411	ASP	3.9
2	B	691	ARG	3.8
1	A	380	PHE	3.8
1	A	130	ALA	3.8
1	A	6	ALA	3.7
1	A	131	ARG	3.7
1	A	182	GLY	3.6
1	A	163	PRO	3.6
1	A	2	ALA	3.5

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	A	129	ARG	3.4
2	B	690	LEU	3.4
1	A	73	SER	3.4
1	A	166	GLU	3.3
1	A	89	ASP	3.2
1	A	124	GLU	3.1
1	A	322	GLN	2.9
1	A	150	LEU	2.9
1	A	377	ILE	2.9
1	A	57	GLU	2.9
1	A	47	ALA	2.8
2	B	672	LEU	2.7
1	A	332	ILE	2.7
1	A	233	VAL	2.7
1	A	184	SER	2.7
1	A	320	ILE	2.7
1	A	242	LEU	2.7
1	A	181	TYR	2.6
1	A	357	GLU	2.6
1	A	114	LYS	2.6
1	A	180	GLY	2.6
2	B	688	ILE	2.5
1	A	382	TRP	2.5
1	A	4	LYS	2.5
1	A	58	GLY	2.5
1	A	127	VAL	2.5
1	A	323	VAL	2.5
1	A	290	ALA	2.4
1	A	46	THR	2.4
1	A	55	ARG	2.4
1	A	74	ASP	2.3
1	A	149	VAL	2.3
1	A	160	LYS	2.3
1	A	325	TRP	2.3
1	A	59	LYS	2.2
1	A	60	ASP	2.2
1	A	162	ASP	2.2
1	A	174	ARG	2.2
1	A	279	LEU	2.2
1	A	410	ASN	2.2
1	A	352	GLU	2.2
1	A	128	ASN	2.2

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Mol	Chain	Res	Type	RSRZ
1	A	140	ILE	2.2
1	A	360	GLU	2.1
1	A	194	LEU	2.0
1	A	324	GLN	2.0
2	B	671	LEU	2.0
1	A	278	CYS	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.