



wwPDB X-ray Structure Validation Summary Report ⓘ

May 13, 2020 – 06:27 pm BST

PDB ID : 5Y0O
Title : Crystal structure of apo BsTmcAL
Authors : Yamashita, S.; Tomita, K.
Deposited on : 2017-07-18
Resolution : 2.30 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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

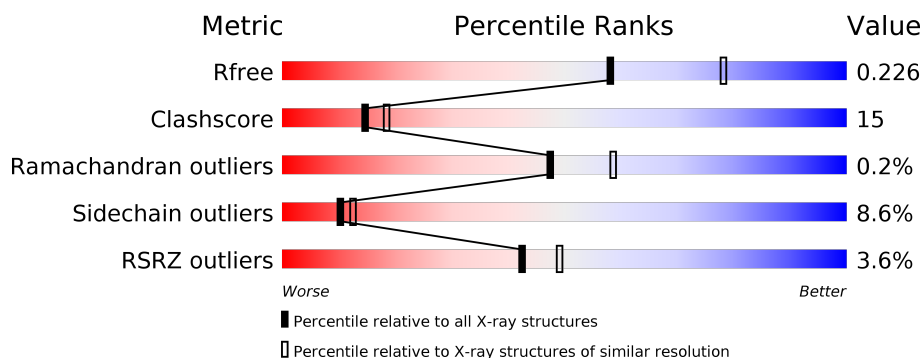
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 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	5042 (2.30-2.30)
Clashscore	141614	5643 (2.30-2.30)
Ramachandran outliers	138981	5575 (2.30-2.30)
Sidechain outliers	138945	5575 (2.30-2.30)
RSRZ outliers	127900	4938 (2.30-2.30)

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	435	<div> <div>2%</div> <div> <div></div> <div>59%</div> <div>33%</div> <div>• 5%</div> </div> </div>
1	B	435	<div> <div>5%</div> <div> <div></div> <div>61%</div> <div>30%</div> <div>• 5%</div> </div> </div>

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 6667 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 UPF0348 protein B4417_3650.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	414	Total	C	N	O	S	0	0	0
			3305	2106	568	619	12			
1	B	414	Total	C	N	O	S	0	0	0
			3305	2106	568	619	12			

There are 40 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-19	MET	-	expression tag	UNP A0A164SIT4
A	-18	GLY	-	expression tag	UNP A0A164SIT4
A	-17	SER	-	expression tag	UNP A0A164SIT4
A	-16	SER	-	expression tag	UNP A0A164SIT4
A	-15	HIS	-	expression tag	UNP A0A164SIT4
A	-14	HIS	-	expression tag	UNP A0A164SIT4
A	-13	HIS	-	expression tag	UNP A0A164SIT4
A	-12	HIS	-	expression tag	UNP A0A164SIT4
A	-11	HIS	-	expression tag	UNP A0A164SIT4
A	-10	HIS	-	expression tag	UNP A0A164SIT4
A	-9	SER	-	expression tag	UNP A0A164SIT4
A	-8	SER	-	expression tag	UNP A0A164SIT4
A	-7	GLY	-	expression tag	UNP A0A164SIT4
A	-6	LEU	-	expression tag	UNP A0A164SIT4
A	-5	VAL	-	expression tag	UNP A0A164SIT4
A	-4	PRO	-	expression tag	UNP A0A164SIT4
A	-3	ARG	-	expression tag	UNP A0A164SIT4
A	-2	GLY	-	expression tag	UNP A0A164SIT4
A	-1	SER	-	expression tag	UNP A0A164SIT4
A	0	HIS	-	expression tag	UNP A0A164SIT4
B	-19	MET	-	expression tag	UNP A0A164SIT4
B	-18	GLY	-	expression tag	UNP A0A164SIT4
B	-17	SER	-	expression tag	UNP A0A164SIT4
B	-16	SER	-	expression tag	UNP A0A164SIT4
B	-15	HIS	-	expression tag	UNP A0A164SIT4

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-14	HIS	-	expression tag	UNP A0A164SIT4
B	-13	HIS	-	expression tag	UNP A0A164SIT4
B	-12	HIS	-	expression tag	UNP A0A164SIT4
B	-11	HIS	-	expression tag	UNP A0A164SIT4
B	-10	HIS	-	expression tag	UNP A0A164SIT4
B	-9	SER	-	expression tag	UNP A0A164SIT4
B	-8	SER	-	expression tag	UNP A0A164SIT4
B	-7	GLY	-	expression tag	UNP A0A164SIT4
B	-6	LEU	-	expression tag	UNP A0A164SIT4
B	-5	VAL	-	expression tag	UNP A0A164SIT4
B	-4	PRO	-	expression tag	UNP A0A164SIT4
B	-3	ARG	-	expression tag	UNP A0A164SIT4
B	-2	GLY	-	expression tag	UNP A0A164SIT4
B	-1	SER	-	expression tag	UNP A0A164SIT4
B	0	HIS	-	expression tag	UNP A0A164SIT4

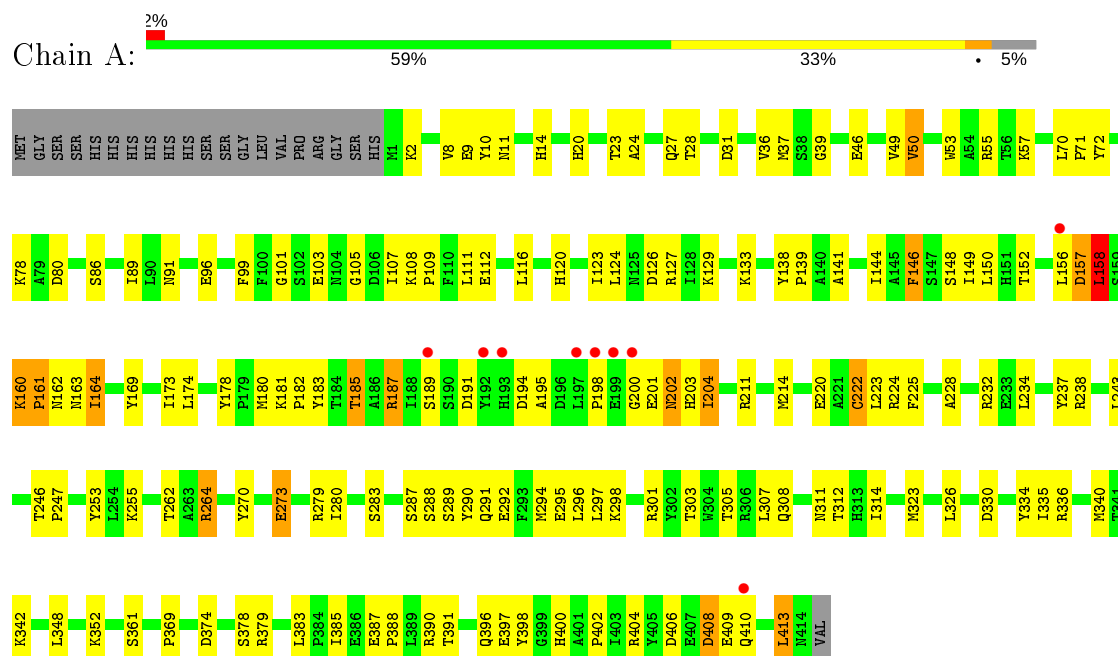
- Molecule 2 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	38	Total O 38 38	0	0
2	B	19	Total O 19 19	0	0

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: UPF0348 protein B4417_3650



E992	F993	D994	L995	Q996	E997	H400	A401	P402	I403	R404	E407	D408	E409	Q410	H411	F412	L413	R414	VAL
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4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	67.75Å 67.66Å 210.81Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.77 – 2.30 48.77 – 2.30	Depositor EDS
% Data completeness (in resolution range)	100.0 (48.77-2.30) 99.6 (48.77-2.30)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.49 (at 2.29Å)	Xtriage
Refinement program	PHENIX 1.8.4 _1496	Depositor
R, R_{free}	0.178 , 0.218 0.185 , 0.226	Depositor DCC
R_{free} test set	2200 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	63.3	Xtriage
Anisotropy	0.244	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 52.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	0.477 for k,h,-l	Xtriage
Reported twinning fraction	0.510 for -k,-h,-l	Depositor
Outliers	0 of 43997 reflections	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	6667	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 4.28% of the height of the origin peak. No significant pseudotranslation is detected.*

¹ Intensities estimated from amplitudes.

² 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 [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	0.39	0/3378	0.60	0/4567
1	B	0.38	0/3378	0.59	1/4567 (0.0%)
All	All	0.38	0/6756	0.59	1/9134 (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	5
1	B	0	3
All	All	0	8

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	B	150	LEU	CA-CB-CG	6.08	129.28	115.30

There are no chirality outliers.

5 of 8 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	158	LEU	Peptide
1	A	160	LYS	Peptide
1	A	161	PRO	Peptide
1	A	189	SER	Peptide
1	A	408	ASP	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	3305	0	3309	107	0
1	B	3305	0	3309	102	1
2	A	38	0	0	0	0
2	B	19	0	0	0	0
All	All	6667	0	6618	202	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 15.

The worst 5 of 202 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:11:ASN:O	1:A:211:ARG:NH1	1.93	1.02
1:B:10:TYR:O	1:B:55:ARG:NH1	2.01	0.92
1:A:387:GLU:HG3	1:A:388:PRO:HA	1.53	0.88
1:A:39:GLY:O	1:A:55:ARG:NH2	2.07	0.86
1:B:78:LYS:NZ	1:B:80:ASP:OD1	2.09	0.85

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:B:137:SER:OG	1:B:355:LEU:O[4_445]	2.10	0.10

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	412/435 (95%)	387 (94%)	24 (6%)	1 (0%)	47	58
1	B	412/435 (95%)	394 (96%)	17 (4%)	1 (0%)	47	58
All	All	824/870 (95%)	781 (95%)	41 (5%)	2 (0%)	47	58

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	204	ILE
1	B	204	ILE

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	356/374 (95%)	327 (92%)	29 (8%)	11	15
1	B	356/374 (95%)	324 (91%)	32 (9%)	9	11
All	All	712/748 (95%)	651 (91%)	61 (9%)	10	12

5 of 61 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	305	THR
1	B	103	GLU
1	B	331	LYS
1	A	413	LEU
1	B	38	SER

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	27	GLN
1	A	120	HIS
1	A	202	ASN
1	A	267	GLN

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Mol	Chain	Res	Type
1	B	267	GLN

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, 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	414/435 (95%)	-0.01	9 (2%) 62 69	36, 69, 124, 184	0
1	B	414/435 (95%)	0.09	21 (5%) 28 35	43, 71, 135, 230	0
All	All	828/870 (95%)	0.04	30 (3%) 42 49	36, 70, 128, 230	0

The worst 5 of 30 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	188	ILE	14.0
1	B	192	TYR	10.1
1	B	194	ASP	7.4
1	B	217	GLN	6.1
1	A	192	TYR	5.6

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.