WORLDWIDE wwPDB PROTEIN DATA BANK

Full wwPDB X-ray Structure Validation Report ⓘ

Sep 23, 2024 – 04:02 PM EDT

PDB ID	:	8VXN
Title	:	Human Bcl-2/Bcl-xL Chimera Fused to Maltose-Binding Protein
Authors	:	Baird, J.; Holliday, M.
Deposited on	:	2024-02-05
Resolution	:	2.09 Å(reported)

The following versions of software and data (see references ⓘ) were used in the production of this report:

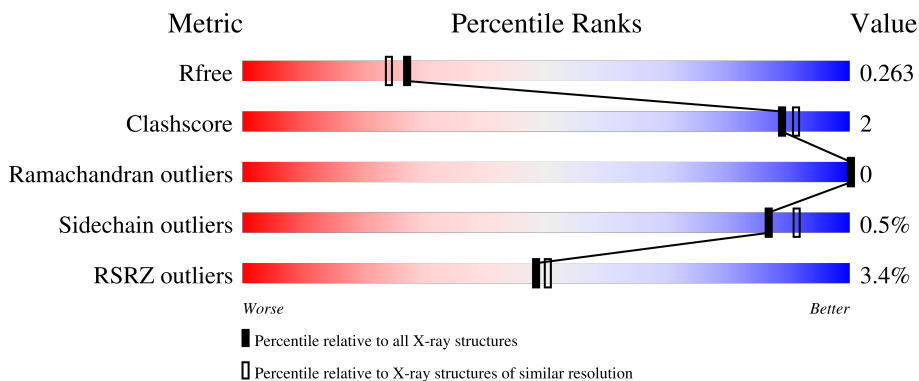|		
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.20.1
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.002 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.38.3

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 2.09 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	Percentile Ranks	Value
Rfree		0.263
Clashscore		2
Ramachandran outliers		0
Sidechain outliers		0.5%
RSRZ outliers		3.4%

Worse ▬ Better

▮ Percentile relative to all X-ray structures
▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	6234 (2.10-2.10)
Clashscore	180529	6893 (2.10-2.10)
Ramachandran outliers	177936	6839 (2.10-2.10)
Sidechain outliers	177891	6840 (2.10-2.10)
RSRZ outliers	164620	6234 (2.10-2.10)

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 of 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	547	3% / 87% 5% 8%

2 Entry composition ⓘ

There are 2 unique types of molecules in this entry. The entry contains 4096 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 Maltose/maltodextrin-binding periplasmic protein fused to apoptosis regulator Bcl-2/Bcl-xL chimera.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	503	3962	2551	661	739	11	0	0	0

There are 29 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-380	MET	-	initiating methionine	UNP P0AEX9
A	-379	HIS	-	expression tag	UNP P0AEX9
A	-378	HIS	-	expression tag	UNP P0AEX9
A	-377	HIS	-	expression tag	UNP P0AEX9
A	-376	HIS	-	expression tag	UNP P0AEX9
A	-375	HIS	-	expression tag	UNP P0AEX9
A	-374	HIS	-	expression tag	UNP P0AEX9
A	-373	HIS	-	expression tag	UNP P0AEX9
A	-372	HIS	-	expression tag	UNP P0AEX9
A	-371	HIS	-	expression tag	UNP P0AEX9
A	-370	HIS	-	expression tag	UNP P0AEX9
A	-369	GLU	-	expression tag	UNP P0AEX9
A	-368	ASN	-	expression tag	UNP P0AEX9
A	-367	LEU	-	expression tag	UNP P0AEX9
A	-366	TYR	-	expression tag	UNP P0AEX9
A	-365	PHE	-	expression tag	UNP P0AEX9
A	-364	GLN	-	expression tag	UNP P0AEX9
A	-363	GLY	-	expression tag	UNP P0AEX9
A	-281	ALA	ASP	engineered mutation	UNP P0AEX9
A	-280	ALA	LYS	engineered mutation	UNP P0AEX9
A	-191	ALA	GLU	engineered mutation	UNP P0AEX9
A	-190	ALA	ASN	engineered mutation	UNP P0AEX9
A	-124	ALA	LYS	engineered mutation	UNP P0AEX9
A	4	ALA	-	linker	UNP P0AEX9
A	5	ALA	-	linker	UNP P0AEX9
A	6	ARG	-	linker	UNP P0AEX9

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Chain	Residue	Modelled	Actual	Comment	Reference
A	7	ALA	-	linker	UNP P0AEX9
A	8	ALA	-	linker	UNP P0AEX9
A	9	ALA	-	linker	UNP P0AEX9

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	134	Total O 134 134		0	0

3 Residue-property plots ⓘ

These plots are drawn for all protein, RNA, DNA and oligosaccharide 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: Maltose/maltodextrin-binding periplasmic protein fused to apoptosis regulator Bcl-2/Bcl-xL chimera
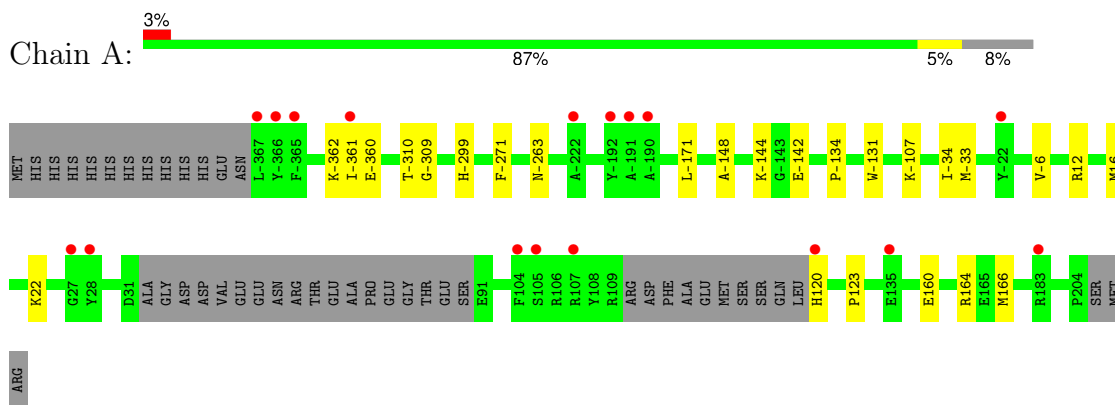
4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	37.07Å 88.95Å 140.94Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	55.24 – 2.09 55.24 – 2.09	Depositor EDS
% Data completeness (in resolution range)	97.0 (55.24-2.09) 97.1 (55.24-2.09)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.35 (at 2.00Å)	Xtriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.204 , 0.264 0.204 , 0.263	Depositor DCC
R_{free} test set	1412 reflections (4.94%)	wwPDB-VP
Wilson B-factor (Å^2)	37.2	Xtriage
Anisotropy	0.540	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.36 , 41.9	EDS
L-test for twinning[2]	$< |L| > = 0.49, < L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	4096	wwPDB-VP
Average B, all atoms (Å^2)	44.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.97% of the height of the origin peak. No significant pseudotranslation is detected.*

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[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	0.27	0/4063	0.46	0/5515

There are no bond length outliers.

There are no bond angle outliers.

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	3962	0	3876	14	0
2	A	134	0	0	1	0
All	All	4096	0	3876	14	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 2.

All (14) 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:-107:LYS:NZ	2:A:305:HOH:O	2.36	0.58
1:A:-144:LYS:HG3	1:A:-142:GLU:HG3	1.89	0.54
1:A:-361:ILE:HG22	1:A:-360:GLU:HG2	1.94	0.49
1:A:160:GLU:O	1:A:164:ARG:HG2	2.13	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:-362:LYS:NZ	1:A:-309:GLY:O	2.48	0.46
1:A:-171:LEU:HD23	1:A:-6:VAL:HG13	1.97	0.46
1:A:-148:ALA:O	1:A:-144:LYS:HE3	2.16	0.45
1:A:-271:PHE:HD2	1:A:-34:ILE:HD11	1.80	0.45
1:A:166:MET:HE2	1:A:166:MET:HB2	1.81	0.44
1:A:12:ARG:O	1:A:16:MET:HG2	2.20	0.42
1:A:-310:THR:HG23	1:A:123:PRO:HG2	2.02	0.42
1:A:-299:HIS:CE1	1:A:-33:MET:HB3	2.54	0.42
1:A:-134:PRO:HA	1:A:-131:TRP:CE2	2.56	0.41
1:A:22:LYS:HA	1:A:22:LYS:HD2	1.90	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	497/547 (91%)	490 (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	403/442 (91%)	401 (100%)	2 (0%)	86	91

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	-263	ASN
1	A	120	HIS

Sometimes 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 ⓘ

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides 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	503/547 (91%)	0.28	17 (3%)	48	50	29, 42, 68, 108	0

All (17) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	-361	ILE	3.8
1	A	-367	LEU	3.6
1	A	-365	PHE	3.3
1	A	104	PHE	2.7
1	A	-191	ALA	2.6
1	A	27	GLY	2.6
1	A	-366	TYR	2.4
1	A	-22	TYR	2.2
1	A	105	SER	2.2
1	A	-222	ALA	2.2
1	A	183	ARG	2.2
1	A	28	TYR	2.1
1	A	-190	ALA	2.1
1	A	120	HIS	2.1
1	A	135	GLU	2.0
1	A	-192	TYR	2.0
1	A	107	ARG	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 ⓘ

There are no monosaccharides in this entry.

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6.4   Ligands ⓘ

There are no ligands in this entry.

6.5   Other polymers ⓘ

There are no such residues in this entry.