



# Full wwPDB X-ray Structure Validation Report ⓘ

Jan 3, 2022 – 02:06 PM EST

PDB ID : 7M5B  
Title : Crystal Structure of human BAK in complex with M3W5\_BID  
Authors : Singh, G.; Aggarwal, A.; Moldoveanu, T.  
Deposited on : 2021-03-23  
Resolution : 1.85 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

<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	:	2.25
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)	:	2.25

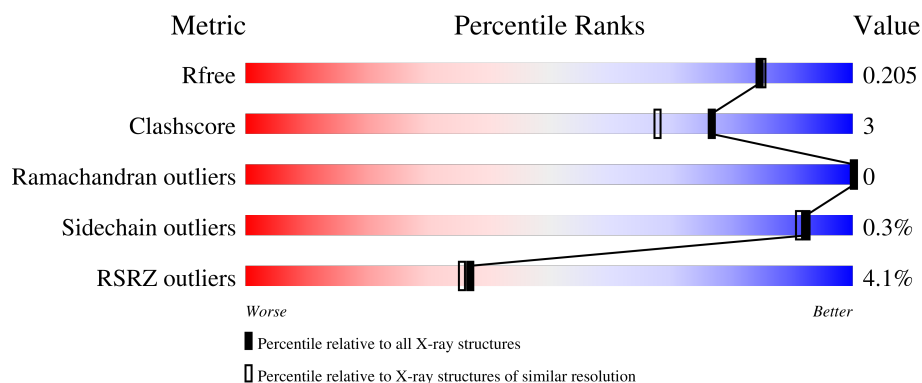
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 1.85 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	2469 (1.86-1.86)
Clashscore	141614	2625 (1.86-1.86)
Ramachandran outliers	138981	2592 (1.86-1.86)
Sidechain outliers	138945	2592 (1.86-1.86)
RSRZ outliers	127900	2436 (1.86-1.86)

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  $\geq 3$ , 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	166	<div> <div>2%</div> <div>88%</div> <div>7%</div> <div>5%</div> </div>
1	C	166	<div> <div>4%</div> <div>89%</div> <div>8%</div> <div>.</div> </div>
2	B	25	<div> <div>8%</div> <div>96%</div> <div>.</div> </div>
2	D	25	<div> <div>12%</div> <div>84%</div> <div>12%</div> <div>.</div> </div>

## 2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 3205 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 Bcl-2 homologous antagonist/killer.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	157	Total	C	N	O	S	0	0	0
			1251	794	221	231	5			
1	C	160	Total	C	N	O	S	0	0	0
			1268	808	222	233	5			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	166	SER	CYS	conflict	UNP Q16611
A	184	CYS	GLY	conflict	UNP Q16611
C	166	SER	CYS	conflict	UNP Q16611
C	184	CYS	GLY	conflict	UNP Q16611

- Molecule 2 is a protein called BH3-interacting domain death agonist p15.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	25	Total	C	N	O	S	0	0	0
			195	116	39	37	3			
2	D	24	Total	C	N	O	S	0	0	0
			186	111	38	34	3			

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	93	MET	VAL	conflict	UNP P55957
B	101	TRP	-	expression tag	UNP P55957
B	102	GLY	-	expression tag	UNP P55957
B	103	GLY	-	expression tag	UNP P55957
B	104	CYS	-	expression tag	UNP P55957
D	93	MET	VAL	conflict	UNP P55957
D	101	TRP	-	expression tag	UNP P55957
D	102	GLY	-	expression tag	UNP P55957

*Continued on next page...*

*Continued from previous page...*

Chain	Residue	Modelled	Actual	Comment	Reference
D	103	GLY	-	expression tag	UNP P55957
D	104	CYS	-	expression tag	UNP P55957

- Molecule 3 is COPPER (II) ION (three-letter code: CU) (formula: Cu).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	B	1	Total Cu 1 1	0	0

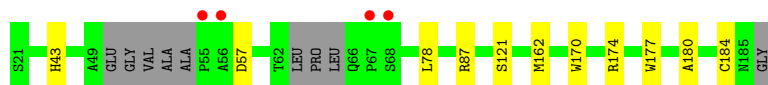
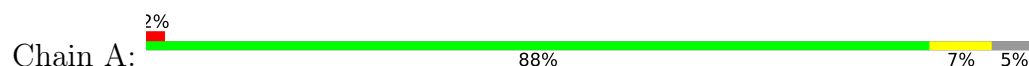
- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	132	Total O 132 132	0	0
4	B	29	Total O 29 29	0	0
4	C	121	Total O 121 121	0	0
4	D	22	Total O 22 22	0	0

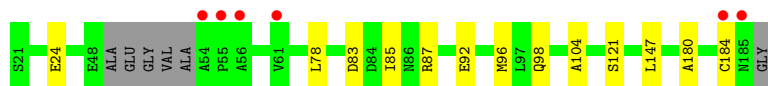
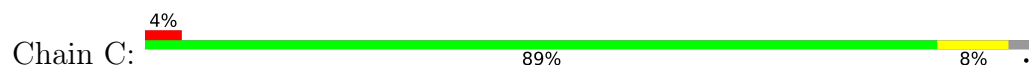
### 3 Residue-property plots [i](#)

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.

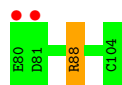
- Molecule 1: Bcl-2 homologous antagonist/killer



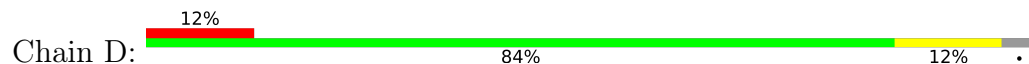
- Molecule 1: Bcl-2 homologous antagonist/killer



- Molecule 2: BH3-interacting domain death agonist p15



- Molecule 2: BH3-interacting domain death agonist p15



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	50.19Å 83.18Å 110.03Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	37.08 – 1.85 40.03 – 1.84	Depositor EDS
% Data completeness (in resolution range)	88.9 (37.08-1.85) 88.4 (40.03-1.84)	Depositor EDS
$R_{merge}$	0.04	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.22 (at 1.84Å)	Xtriage
Refinement program	PHENIX 1.16_3546	Depositor
R, $R_{free}$	0.170 , 0.205 0.174 , 0.205	Depositor DCC
$R_{free}$ test set	1824 reflections (5.09%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	20.0	Xtriage
Anisotropy	0.129	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 49.6	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	3205	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	24.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.87% 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 [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: CU

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	0.75	0/1279	0.74	1/1731 (0.1%)
1	C	0.76	2/1298 (0.2%)	0.69	0/1762
2	B	0.84	0/197	0.83	1/262 (0.4%)
2	D	0.93	0/188	0.90	0/250
All	All	0.77	2/2962 (0.1%)	0.74	2/4005 (0.0%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	24	GLU	CD-OE1	-5.37	1.19	1.25
1	C	98	GLN	C-O	-5.00	1.13	1.23

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	88	ARG	NE-CZ-NH2	-5.77	117.42	120.30
1	A	184	CYS	C-N-CA	5.20	134.70	121.70

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	1251	0	1180	5	0
1	C	1268	0	1201	11	0
2	B	195	0	182	2	0
2	D	186	0	177	5	0
3	B	1	0	0	0	0
4	A	132	0	0	0	0
4	B	29	0	0	0	0
4	C	121	0	0	1	0
4	D	22	0	0	0	0
All	All	3205	0	2740	16	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 3.

All (16) 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:C:184:CYS:SG	2:D:104:CYS:HB2	1.69	1.31
1:C:184:CYS:SG	2:D:104:CYS:CB	2.34	1.14
2:B:88:ARG:NH2	1:C:92:GLU:OE2	2.15	0.77
1:A:78:LEU:HD21	1:A:180:ALA:HB1	1.85	0.57
1:A:43:HIS:CE1	1:A:57:ASP:H	2.25	0.55
1:C:85:ILE:HG22	2:D:93:MET:HG3	1.91	0.53
1:C:121:SER:HB3	4:C:238:HOH:O	2.10	0.51
1:C:83:ASP:O	1:C:87:ARG:HG2	2.14	0.48
1:C:184:CYS:HG	2:D:104:CYS:CB	2.08	0.46
1:A:87:ARG:HH11	1:A:87:ARG:HG3	1.82	0.44
2:B:88:ARG:HH22	1:C:92:GLU:CD	2.13	0.43
1:A:162:MET:HE1	1:A:177:TRP:CZ2	2.56	0.41
1:C:96:MET:SD	2:D:85:ASN:ND2	2.94	0.41
1:C:78:LEU:HD21	1:C:180:ALA:HB1	2.03	0.41
1:A:170:TRP:O	1:A:174:ARG:HG2	2.21	0.40
1:C:104:ALA:HB2	1:C:147:LEU:HD21	2.03	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	151/166 (91%)	151 (100%)	0	0	100	100
1	C	156/166 (94%)	156 (100%)	0	0	100	100
2	B	23/25 (92%)	23 (100%)	0	0	100	100
2	D	22/25 (88%)	22 (100%)	0	0	100	100
All	All	352/382 (92%)	352 (100%)	0	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	127/136 (93%)	126 (99%)	1 (1%)	81	76
1	C	129/136 (95%)	129 (100%)	0	100	100
2	B	20/20 (100%)	20 (100%)	0	100	100
2	D	19/20 (95%)	19 (100%)	0	100	100
All	All	295/312 (95%)	294 (100%)	1 (0%)	92	91

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	121	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such

sidechains are listed below:

Mol	Chain	Res	Type
2	D	85	ASN

### 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 monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 1 ligands modelled in this entry, 1 is monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 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, 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	157/166 (94%)	-0.09	4 (2%) 57 56	8, 20, 45, 63	0
1	C	160/166 (96%)	-0.15	6 (3%) 40 38	9, 22, 43, 63	0
2	B	25/25 (100%)	-0.05	2 (8%) 12 12	9, 17, 34, 47	0
2	D	24/25 (96%)	0.25	3 (12%) 3 4	13, 22, 41, 49	0
All	All	366/382 (95%)	-0.09	15 (4%) 37 35	8, 21, 43, 63	0

All (15) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	D	104	CYS	7.4
1	C	185	ASN	5.2
1	C	54	ALA	4.6
1	C	184	CYS	3.9
1	A	68	SER	3.3
2	D	103	GLY	3.1
2	B	81	ASP	3.1
1	C	55	PRO	3.0
1	A	55	PRO	2.5
2	B	80	GLU	2.5
1	A	56	ALA	2.4
2	D	102	GLY	2.2
1	C	61	VAL	2.1
1	C	56	ALA	2.1
1	A	67	PRO	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 monosaccharides in this entry.

### 6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	CU	B	201	1/1	0.99	0.06	17,17,17,17	0

### 6.5 Other polymers [i](#)

There are no such residues in this entry.