



# Full wwPDB X-ray Structure Validation Report ⓘ

May 16, 2020 – 04:09 pm BST

PDB ID : 6VBC  
Title : Crystal structure of transpeptidase domain of PBP2 from *Neisseria gonorrhoeae* cephalosporin-resistant strain H041  
Authors : Singh, A.; Davies, C.  
Deposited on : 2019-12-18  
Resolution : 1.55 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.

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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) : 1.13  
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

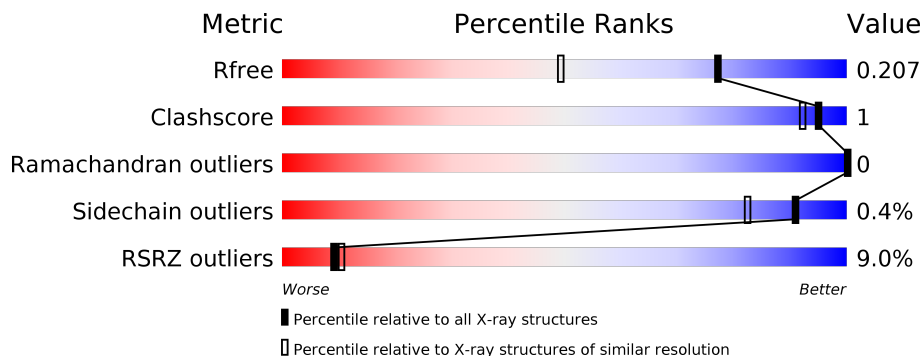
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

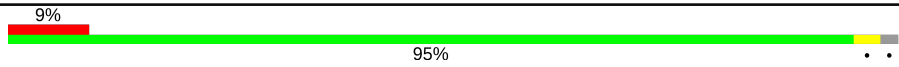
The reported resolution of this entry is 1.55 Å.

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	1483 (1.56-1.56)
Clashscore	141614	1529 (1.56-1.56)
Ramachandran outliers	138981	1498 (1.56-1.56)
Sidechain outliers	138945	1495 (1.56-1.56)
RSRZ outliers	127900	1465 (1.56-1.56)

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 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	330	

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 2657 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 Probable peptidoglycan D,D-transpeptidase PenA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	324	2504	1604	430	461	9	0	10	0

There are 20 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	232	GLY	-	expression tag	UNP F2Z7K9
A	233	SER	-	expression tag	UNP F2Z7K9
A	234	GLY	-	expression tag	UNP F2Z7K9
A	235	GLY	-	expression tag	UNP F2Z7K9
A	236	ALA	-	expression tag	UNP F2Z7K9
A	297	GLY	ALA	conflict	UNP F2Z7K9
A	?	-	TYR	deletion	UNP F2Z7K9
A	?	-	GLU	deletion	UNP F2Z7K9
A	?	-	PRO	deletion	UNP F2Z7K9
A	?	-	ASN	deletion	UNP F2Z7K9
A	?	-	LYS	deletion	UNP F2Z7K9
A	?	-	PRO	deletion	UNP F2Z7K9
A	?	-	GLY	deletion	UNP F2Z7K9
A	?	-	GLN	deletion	UNP F2Z7K9
A	?	-	ALA	deletion	UNP F2Z7K9
A	?	-	ASP	deletion	UNP F2Z7K9
A	?	-	SER	deletion	UNP F2Z7K9
A	?	-	GLU	deletion	UNP F2Z7K9
A	?	-	GLN	deletion	UNP F2Z7K9
A	?	-	ARG	deletion	UNP F2Z7K9

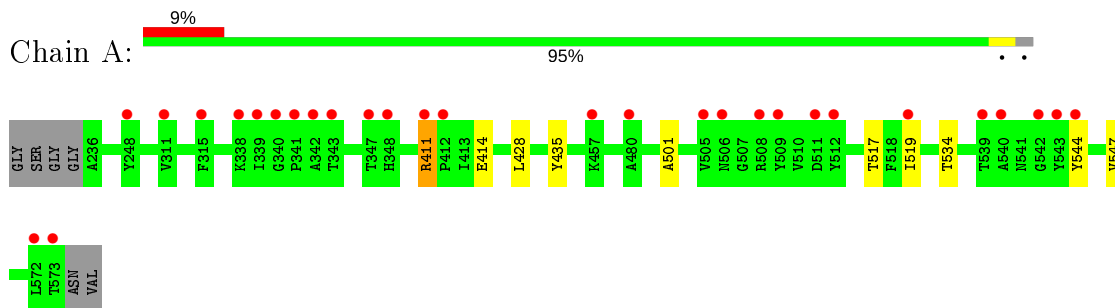
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	153	Total	O	0	0
			153	153		

### 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: Probable peptidoglycan D,D-transpeptidase PenA



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	50.43Å 61.33Å 108.96Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	31.69 – 1.55 31.69 – 1.55	Depositor EDS
% Data completeness (in resolution range)	97.5 (31.69-1.55) 97.5 (31.69-1.55)	Depositor EDS
$R_{merge}$	0.12	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	4.51 (at 1.55Å)	Xtrriage
Refinement program	REFMAC 5.8.0218	Depositor
R, $R_{free}$	0.178 , 0.200 0.190 , 0.207	Depositor DCC
$R_{free}$ test set	2347 reflections (4.84%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	15.7	Xtrriage
Anisotropy	0.365	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.40 , 46.5	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	2657	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	17.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.46% 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	0.37	0/2584	0.64	0/3508

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	2504	0	2597	6	0
2	A	153	0	0	0	0
All	All	2657	0	2597	6	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 1.

All (6) 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:544:TYR:CD2	1:A:547[A]:VAL:HG23	2.37	0.60
1:A:411[B]:ARG:HD3	1:A:414[B]:GLU:OE2	2.02	0.59
1:A:544:TYR:HD2	1:A:547[A]:VAL:HG23	1.75	0.50
1:A:428:LEU:HD13	1:A:534:THR:HG23	1.97	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:435:TYR:CD1	1:A:519[B]:ILE:HD13	2.56	0.41
1:A:501:ALA:HB2	1:A:517[A]:THR:HG21	2.04	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	332/330 (101%)	330 (99%)	2 (1%)	0	<a href="#">100</a> <a href="#">100</a>

There are no Ramachandran outliers to report.

### 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	272/265 (103%)	270 (99%)	2 (1%)	<a href="#">84</a> <a href="#">69</a>

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

Mol	Chain	Res	Type
1	A	411[A]	ARG
1	A	411[B]	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such

sidechains are listed below:

Mol	Chain	Res	Type
1	A	252	ASN
1	A	425	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, 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	324/330 (98%)	0.50	29 (8%) <b>9</b> <b>10</b>	9, 15, 31, 48	0

All (29) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	544	TYR	9.1
1	A	543	TYR	6.8
1	A	509	TYR	6.0
1	A	512	TYR	5.4
1	A	539	THR	5.1
1	A	340	GLY	4.6
1	A	412	PRO	4.6
1	A	519[A]	ILE	4.4
1	A	542	GLY	4.4
1	A	341	PRO	4.3
1	A	540	ALA	3.9
1	A	573	THR	3.5
1	A	508	ARG	3.5
1	A	342	ALA	3.3
1	A	505	VAL	3.2
1	A	248	TYR	3.1
1	A	572	LEU	3.0
1	A	339	ILE	2.7
1	A	311	VAL	2.7
1	A	348	HIS	2.6
1	A	411[A]	ARG	2.5
1	A	506	ASN	2.4
1	A	480	ALA	2.3
1	A	511	ASP	2.3
1	A	315	PHE	2.1
1	A	343	THR	2.1
1	A	457	LYS	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	338	LYS	2.1
1	A	347	THR	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.