



# wwPDB X-ray Structure Validation Summary Report ⓘ

Jun 17, 2024 – 07:27 AM EDT

PDB ID : 3HNQ  
Title : Crystal Structure of Virulence protein STM3117 from Salmonella typhimurium. Northeast Structural Genomics Consortium target id StR274  
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Deposited on : 2009-05-31  
Resolution : 2.10 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](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 types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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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
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.20.1
EDS	:	2.37.1
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)	:	2.37.1

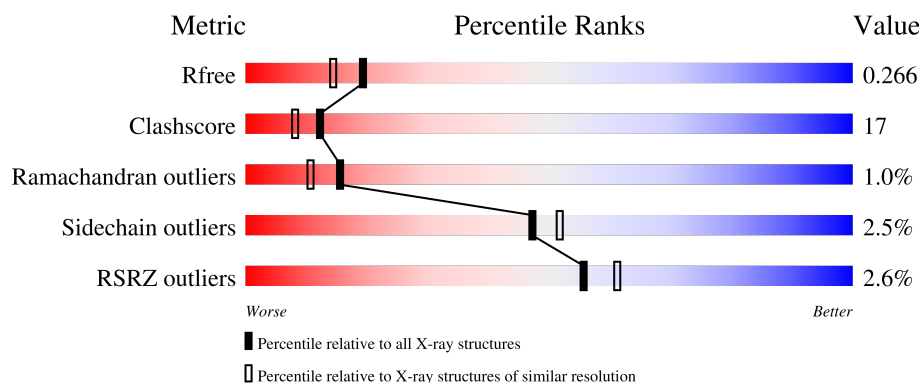
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.10 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	5197 (2.10-2.10)
Clashscore	141614	5710 (2.10-2.10)
Ramachandran outliers	138981	5647 (2.10-2.10)
Sidechain outliers	138945	5648 (2.10-2.10)
RSRZ outliers	127900	5083 (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  $\geq 3$ , 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	144	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 0%, red 1%, green 1%, green 65%, yellow 65%, yellow 87%, grey 87%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> <span>%</span> <span>65%</span> <span>22%</span> <span>12%</span> </div> </div>
1	B	144	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 0%, red 3%, green 3%, green 58%, yellow 58%, yellow 87%, grey 87%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> <span>3%</span> <span>58%</span> <span>29%</span> <span>• 12%</span> </div> </div>
1	C	144	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, green 0%, green 64%, yellow 64%, yellow 86%, grey 86%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> <span></span> <span>64%</span> <span>22%</span> <span>• 12%</span> </div> </div>
1	D	144	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 0%, red 6%, green 6%, green 51%, yellow 51%, yellow 82%, grey 82%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> <span>6%</span> <span>51%</span> <span>31%</span> <span>• • 12%</span> </div> </div>

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 4133 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 Virulence protein STM3117.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	126	Total	C	N	O	S	Se	0	0	0
			982	623	162	193	1	3			
1	B	126	Total	C	N	O	S	Se	0	0	0
			968	613	162	189	1	3			
1	C	126	Total	C	N	O	S	Se	0	0	0
			982	623	162	193	1	3			
1	D	126	Total	C	N	O	S	Se	0	0	0
			982	623	162	193	1	3			

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	60	Total	O	0	0
			60	60		
2	B	55	Total	O	0	0
			55	55		
2	C	63	Total	O	0	0
			63	63		
2	D	41	Total	O	0	0
			41	41		



P84	
A87	
D88	
I92	
I97	
V100	
V101	
S102	
Q106	
E113	
G114	
P115	
V116	
E117	
T122	
G123	
E124	
I125	
M126	
S127	
I128	
D132	
P133	
N136	
V144	

## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	39.95Å 134.62Å 51.36Å 90.00° 112.71° 90.00°	Depositor
Resolution (Å)	47.37 – 2.10 47.37 – 2.00	Depositor EDS
% Data completeness (in resolution range)	92.9 (47.37-2.10) 91.9 (47.37-2.00)	Depositor EDS
$R_{merge}$	0.09	Depositor
$R_{sym}$	0.08	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.22 (at 2.00Å)	Xtriage
Refinement program	CNS 1.2	Depositor
R, $R_{free}$	0.215 , 0.251 0.232 , 0.266	Depositor DCC
$R_{free}$ test set	2531 reflections (4.08%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	23.1	Xtriage
Anisotropy	0.144	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.38 , 29.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.156 for h,-k,-h-l	Xtriage
$F_o, F_c$ correlation	0.92	EDS
Total number of atoms	4133	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	27.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.94% 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](#)

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	0.42	0/996	0.65	0/1346
1	B	0.39	0/981	0.64	0/1327
1	C	0.40	0/996	0.63	0/1346
1	D	0.70	4/996 (0.4%)	0.67	1/1346 (0.1%)
All	All	0.49	4/3969 (0.1%)	0.65	1/5365 (0.0%)

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	51	THR	C-O	-9.42	1.05	1.23
1	D	57	LYS	CE-NZ	-7.42	1.30	1.49
1	D	57	LYS	C-O	-6.57	1.10	1.23
1	D	57	LYS	CG-CD	-6.28	1.31	1.52

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	74	GLU	N-CA-C	5.96	127.08	111.00

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	982	0	986	24	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	B	968	0	971	37	3
1	C	982	0	986	30	0
1	D	982	0	986	61	3
2	A	60	0	0	0	0
2	B	55	0	0	2	0
2	C	63	0	0	1	0
2	D	41	0	0	3	0
All	All	4133	0	3929	133	3

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 17.

The worst 5 of 133 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:114:GLY:HA2	1:C:116:VAL:HG23	1.52	0.90
1:D:101:VAL:HG22	1:D:128:ILE:HG12	1.64	0.77
1:D:55:ASN:O	1:D:56:ARG:HD3	1.85	0.76
1:B:34:ILE:H	1:B:70:GLN:HE21	1.35	0.74
1:A:19:MSE:HE2	1:B:100:VAL:HG13	1.68	0.74

All (3) 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:107:ALA:O	1:D:54:GLN:O[2_556]	2.05	0.15
1:B:43:GLU:OE1	1:D:56:ARG:NH1[2_556]	2.14	0.06
1:B:43:GLU:OE2	1:D:56:ARG:NH2[2_556]	2.15	0.05

## 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	124/144 (86%)	121 (98%)	2 (2%)	1 (1%)	19	15
1	B	124/144 (86%)	119 (96%)	3 (2%)	2 (2%)	9	5
1	C	124/144 (86%)	119 (96%)	5 (4%)	0	100	100
1	D	124/144 (86%)	117 (94%)	5 (4%)	2 (2%)	9	5
All	All	496/576 (86%)	476 (96%)	15 (3%)	5 (1%)	15	11

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	114	GLY
1	B	73	MSE
1	B	54	GLN
1	D	75	PHE
1	D	77	PRO

### 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	111/124 (90%)	111 (100%)	0	100	100
1	B	108/124 (87%)	106 (98%)	2 (2%)	57	63
1	C	111/124 (90%)	109 (98%)	2 (2%)	59	65
1	D	111/124 (90%)	104 (94%)	7 (6%)	18	15
All	All	441/496 (89%)	430 (98%)	11 (2%)	47	52

5 of 11 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	54	GLN
1	D	70	GLN
1	D	75	PHE
1	D	72	GLU
1	D	22	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 13 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	136	ASN
1	D	26	HIS
1	D	142	GLN
1	D	71	GLN
1	D	136	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](#)

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	123/144 (85%)	-0.35	1 (0%) 86 88	15, 23, 32, 37	0
1	B	123/144 (85%)	0.03	4 (3%) 46 53	16, 28, 45, 65	0
1	C	123/144 (85%)	-0.27	0 100 100	15, 23, 40, 46	1 (0%)
1	D	123/144 (85%)	0.12	8 (6%) 18 23	16, 27, 42, 62	0
All	All	492/576 (85%)	-0.12	13 (2%) 56 61	15, 25, 42, 65	1 (0%)

The worst 5 of 13 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	52	PHE	7.1
1	D	76	GLU	6.3
1	D	54	GLN	5.9
1	D	55	ASN	4.6
1	D	74	GLU	4.0

### 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](#)

There are no ligands in this entry.

## 6.5 Other polymers [i](#)

There are no such residues in this entry.