



# Full wwPDB X-ray Structure Validation Report ⓘ

May 22, 2020 – 05:59 am BST

PDB ID : 3ZQF  
Title : Structure of Tetracycline repressor in complex with antiinducer peptide-TAP1  
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Deposited on : 2011-06-09  
Resolution : 2.56 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

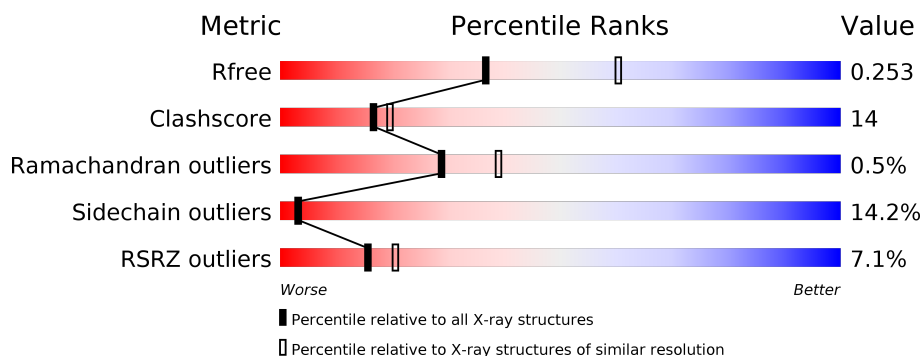
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.56 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	1279 (2.58-2.54)
Clashscore	141614	1327 (2.58-2.54)
Ramachandran outliers	138981	1312 (2.58-2.54)
Sidechain outliers	138945	1312 (2.58-2.54)
RSRZ outliers	127900	1269 (2.58-2.54)

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	208	
2	C	16	

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 1558 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 TETRACYCLINE REPRESSOR PROTEIN CLASS B FROM TRANSPOSON TN10, TETRACYCLINE REPRESSOR PROTEIN CLASS D.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	183	Total	C	N	O	S	0	0	0
			1462	928	263	270	1			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	68	SER	CYS	engineered mutation	UNP P04483
A	88	ASN	CYS	engineered mutation	UNP P04483
A	121	THR	CYS	engineered mutation	UNP P04483
A	144	SER	CYS	engineered mutation	UNP P04483

- Molecule 2 is a protein called ANTI-INDUCER PEPTIDE TAP1.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	C	13	Total	C	N	O	0	0	0
			91	55	22	14			

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	5	Total	O	0	0
			5	5		



## 4 Data and refinement statistics

Property	Value	Source
Space group	I 41	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	68.65Å 68.65Å 182.16Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	32.18 – 2.56 32.18 – 2.56	Depositor EDS
% Data completeness (in resolution range)	100.0 (32.18-2.56) 99.6 (32.18-2.56)	Depositor EDS
$R_{merge}$	0.05	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.08 (at 2.57Å)	Xtriage
Refinement program	REFMAC 5.5.0109	Depositor
R, $R_{free}$	0.206 , 0.247 0.217 , 0.253	Depositor DCC
$R_{free}$ test set	673 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	68.5	Xtriage
Anisotropy	0.092	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 69.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	0.062 for -h,k,-l	Xtriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	1558	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	83.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.18% 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	1.13	0/1489	1.12	3/2011 (0.1%)
2	C	0.81	0/90	1.25	1/119 (0.8%)
All	All	1.12	0/1579	1.13	4/2130 (0.2%)

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	1

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed( $^{\circ}$ )	Ideal( $^{\circ}$ )
1	A	80	ARG	NE-CZ-NH2	-7.22	116.69	120.30
2	C	6	LEU	CA-CB-CG	-6.51	100.33	115.30
1	A	53	ASP	CB-CG-OD1	5.58	123.32	118.30
1	A	79	LEU	CB-CG-CD1	5.15	119.75	111.00

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	166	MET	Peptide

### 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	1462	0	1457	40	0
2	C	91	0	99	7	0
3	A	5	0	0	0	0
All	All	1558	0	1556	44	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 14.

All (44) 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:25:LEU:C	1:A:25:LEU:HD23	1.87	0.95
1:A:204:LEU:HD23	1:A:204:LEU:H	1.44	0.81
1:A:180:GLN:HB2	1:A:184:PRO:HG3	1.63	0.78
1:A:25:LEU:O	1:A:25:LEU:HD23	1.84	0.77
1:A:117:LEU:O	1:A:121:THR:OG1	2.11	0.68
2:C:4:GLU:C	2:C:6:LEU:H	2.00	0.65
1:A:83:ALA:HB2	1:A:137:VAL:CG1	2.28	0.63
1:A:172:GLN:O	1:A:176:LEU:HB2	1.99	0.62
1:A:200:GLN:OE1	1:A:200:GLN:HA	1.98	0.61
1:A:59:MET:HE1	1:A:93:HIS:HB2	1.81	0.61
1:A:119:PHE:CD2	1:A:120:LEU:HD23	2.37	0.60
1:A:59:MET:CE	1:A:93:HIS:HB2	2.33	0.59
1:A:193:LEU:HD22	1:A:197:PHE:CZ	2.40	0.56
1:A:25:LEU:C	1:A:25:LEU:CD2	2.66	0.56
1:A:112:THR:HG22	2:C:16:ARG:HG2	1.88	0.56
1:A:107:GLU:HG3	1:A:108:LYS:N	2.20	0.55
1:A:3:ARG:HD2	1:A:3:ARG:O	2.08	0.54
1:A:16:LEU:O	1:A:20:VAL:HG22	2.11	0.51
1:A:64:HIS:HD2	2:C:16:ARG:O	1.92	0.51
1:A:171:ARG:NH1	1:A:175:GLU:HB2	2.27	0.50
1:A:59:MET:HE3	1:A:93:HIS:ND1	2.27	0.49
1:A:78:PHE:O	1:A:79:LEU:C	2.48	0.49
1:A:146:LEU:HA	1:A:146:LEU:HD23	1.77	0.47
1:A:25:LEU:O	1:A:48:LYS:HE2	2.14	0.47
1:A:201:LEU:HA	1:A:201:LEU:HD22	1.44	0.46
1:A:109:GLN:HB3	2:C:13:ALA:O	2.15	0.46
2:C:4:GLU:C	2:C:6:LEU:N	2.67	0.46
1:A:55:LEU:HD12	1:A:55:LEU:HA	1.84	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:14:LEU:HD23	1:A:55:LEU:HG	1.98	0.45
1:A:120:LEU:O	1:A:125:PHE:HB2	2.18	0.44
1:A:176:LEU:O	1:A:180:GLN:HG2	2.18	0.44
1:A:134:LEU:HA	1:A:134:LEU:HD23	1.62	0.43
1:A:171:ARG:HH12	1:A:175:GLU:HB2	1.84	0.43
1:A:133:ALA:O	1:A:137:VAL:HG23	2.18	0.43
2:C:6:LEU:HG	2:C:6:LEU:O	2.18	0.42
1:A:193:LEU:HD22	1:A:197:PHE:CE2	2.55	0.42
1:A:183:GLU:N	1:A:184:PRO:HD2	2.35	0.42
1:A:167:PRO:CB	1:A:168:PRO:HD2	2.50	0.41
1:A:204:LEU:H	1:A:204:LEU:CD2	2.14	0.41
1:A:26:THR:OG1	1:A:29:LYS:HG3	2.21	0.41
1:A:113:LEU:HA	1:A:113:LEU:HD12	1.77	0.41
1:A:3:ARG:CG	1:A:3:ARG:O	2.68	0.41
1:A:131:LEU:HA	1:A:131:LEU:HD23	1.80	0.40
2:C:12:LEU:HD13	2:C:12:LEU:HA	1.89	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	177/208 (85%)	165 (93%)	11 (6%)	1 (1%)	25	33
2	C	11/16 (69%)	10 (91%)	1 (9%)	0	100	100
All	All	188/224 (84%)	175 (93%)	12 (6%)	1 (0%)	29	39

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	203	ALA



### 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	155/179 (87%)	135 (87%)	20 (13%)	4	4
2	C	7/10 (70%)	4 (57%)	3 (43%)	0	0
All	All	162/189 (86%)	139 (86%)	23 (14%)	3	3

All (23) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	6	LYS
1	A	25	LEU
1	A	28	ARG
1	A	55	LEU
1	A	59	MET
1	A	61	ASP
1	A	64	HIS
1	A	66	HIS
1	A	79	LEU
1	A	94	ARG
1	A	108	LYS
1	A	121	THR
1	A	127	LEU
1	A	150	GLU
1	A	176	LEU
1	A	193	LEU
1	A	195	ARG
1	A	198	GLU
1	A	201	LEU
1	A	204	LEU
2	C	8	ARG
2	C	12	LEU
2	C	16	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	81	ASN
1	A	151	HIS

### 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	183/208 (87%)	0.22	14 (7%) 13 18	51, 79, 116, 136	0
2	C	13/16 (81%)	-0.21	0 100 100	77, 85, 100, 110	0
All	All	196/224 (87%)	0.19	14 (7%) 16 20	51, 80, 116, 136	0

All (14) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	203	ALA	4.5
1	A	204	LEU	4.0
1	A	136	ALA	3.6
1	A	139	HIS	3.0
1	A	107	GLU	2.9
1	A	144	SER	2.7
1	A	138	GLY	2.5
1	A	137	VAL	2.5
1	A	140	PHE	2.4
1	A	135	SER	2.4
1	A	189	GLY	2.3
1	A	168	PRO	2.2
1	A	166	MET	2.0
1	A	134	LEU	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

There are no ligands in this entry.

## 6.5 Other polymers

There are no such residues in this entry.