



wwPDB X-ray Structure Validation Summary Report ⓘ

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PDB ID : 3K4E / pdb_00003k4e
Title : Puf3 RNA binding domain bound to Cox17 RNA 3' UTR recognition sequence site A
Authors : Zhu, D.; Stumpf, C.R.; Krahn, J.M.; Wickens, M.; Hall, T.M.T.
Deposited on : 2009-10-05
Resolution : 3.20 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

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>.

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

MolProbity : 4-5-2 with Phenix2.0
Xtrriage (Phenix) : 2.0
EDS : 3.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

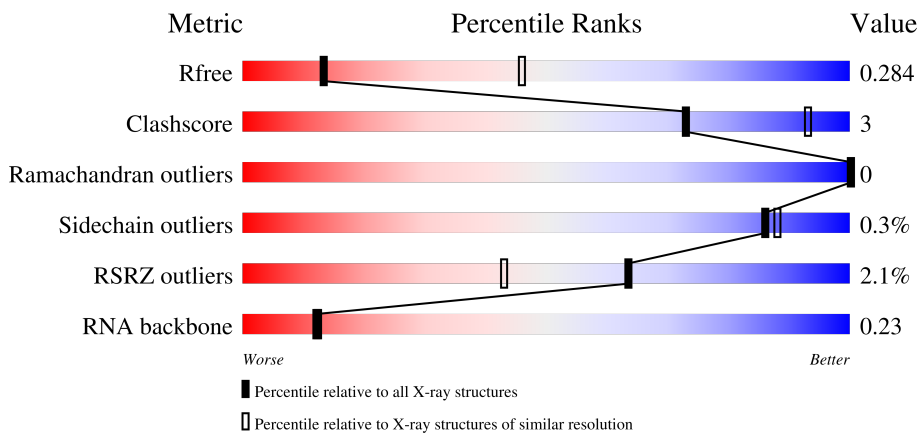
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.20 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}	180053	1466 (3.20-3.20)
Clashscore	190562	1573 (3.20-3.20)
Ramachandran outliers	187476	1548 (3.20-3.20)
Sidechain outliers	187428	1547 (3.20-3.20)
RSRZ outliers	180081	1466 (3.20-3.20)
RNA backbone	3983	1222 (3.50-2.90)

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 $\leq 5\%$. 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	369	 85% 8% 7%
1	C	369	 85% 8% 7%
1	E	369	 85% 8% 7%
2	B	10	 70% 30%

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Mol	Chain	Length	Quality of chain
2	D	10	 80% 20%
2	F	10	 70% 30%

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 9036 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 mRNA-binding protein PUF3.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	343	2771	1767	463	531	10	0	0	0
1	C	343	2771	1767	463	531	10	0	0	0
1	E	343	2771	1767	463	531	10	0	0	0

- Molecule 2 is a RNA chain called RNA (5'-R(P*CP*UP*UP*GP*UP*AP*UP*AP*UP*A)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
2	B	10	210	94	33	73	10	0	0	0
2	D	10	210	94	33	73	10	0	0	0
2	F	10	210	94	33	73	10	0	0	0

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	38	Total 38	O 38	0	0
3	B	1	Total 1	O 1	0	0
3	C	22	Total 22	O 22	0	0
3	D	3	Total 3	O 3	0	0
3	E	25	Total 25	O 25	0	0
3	F	4	Total 4	O 4	0	0



- Molecule 2: RNA (5'-R(P*CP*UP*UP*GP*UP*AP*UP*AP*UP*A)-3')

Chain D: 80% 20%



- Molecule 2: RNA (5'-R(P*CP*UP*UP*GP*UP*AP*UP*AP*UP*A)-3')

Chain F: 70% 30%



4 Data and refinement statistics i

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	150.08Å 87.13Å 124.91Å 90.00° 116.23° 90.00°	Depositor
Resolution (Å)	28.91 – 3.20 28.91 – 3.20	Depositor EDS
% Data completeness (in resolution range)	97.8 (28.91-3.20) 97.6 (28.91-3.20)	Depositor EDS
R_{merge}	0.15	Depositor
R_{sym}	0.15	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.21 (at 3.18Å)	Xtrriage
Refinement program	PHENIX	Depositor
R, R_{free}	0.247 , 0.297 0.238 , 0.284	Depositor DCC
R_{free} test set	1204 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å ²)	46.6	Xtrriage
Anisotropy	0.500	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.27 , 29.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.088 for $1/2^*h+3/2^*k, 1/2^*h-1/2^*k, -1/2^*h-1/2^*k-l$ 0.065 for $1/2^*h-3/2^*k, -1/2^*h-1/2^*k, -1/2^*h+1/2^*k-l$	Xtrriage
F_o, F_c correlation	0.88	EDS
Total number of atoms	9036	wwPDB-VP
Average B, all atoms (Å ²)	62.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.97% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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	0.41	0/2811	0.75	2/3783 (0.1%)
1	C	0.42	0/2811	0.77	2/3783 (0.1%)
1	E	0.41	0/2811	0.75	2/3783 (0.1%)
2	B	0.48	0/233	0.95	0/358
2	D	0.52	0/233	0.98	0/358
2	F	0.49	0/233	0.93	0/358
All	All	0.42	0/9132	0.78	6/12423 (0.0%)

There are no bond length outliers.

The worst 5 of 6 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	515	SER	CA-C-N	5.60	124.80	118.97
1	E	515	SER	C-N-CA	5.60	124.80	118.97
1	C	515	SER	CA-C-N	5.58	124.78	118.97
1	C	515	SER	C-N-CA	5.58	124.78	118.97
1	A	515	SER	CA-C-N	5.16	124.33	118.97

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	2771	0	2807	18	0
1	C	2771	0	2807	17	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	E	2771	0	2807	17	0
2	B	210	0	106	2	0
2	D	210	0	106	1	0
2	F	210	0	106	3	0
3	A	38	0	0	1	0
3	B	1	0	0	0	0
3	C	22	0	0	1	0
3	D	3	0	0	0	0
3	E	25	0	0	0	0
3	F	4	0	0	0	0
All	All	9036	0	8739	57	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.

The worst 5 of 57 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:748:LYS:HD2	3:A:58:HOH:O	1.81	0.79
1:C:771:HIS:HB3	1:C:774:ALA:HB3	1.87	0.56
1:A:687:ILE:HD13	1:A:715:ILE:HA	1.87	0.56
1:A:771:HIS:HB3	1:A:774:ALA:HB3	1.89	0.55
1:E:687:ILE:HD13	1:E:715:ILE:HA	1.88	0.55

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	337/369 (91%)	330 (98%)	7 (2%)	0	100 100
1	C	337/369 (91%)	330 (98%)	7 (2%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	E	337/369 (91%)	331 (98%)	6 (2%)	0	100	100
All	All	1011/1107 (91%)	991 (98%)	20 (2%)	0	100	100

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	315/339 (93%)	314 (100%)	1 (0%)	86	88
1	C	315/339 (93%)	314 (100%)	1 (0%)	86	88
1	E	315/339 (93%)	314 (100%)	1 (0%)	86	88
All	All	945/1017 (93%)	942 (100%)	3 (0%)	86	88

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	797	ILE
1	C	797	ILE
1	E	797	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 10 such sidechains are listed below:

Mol	Chain	Res	Type
1	E	653	GLN
1	E	737	GLN
1	E	764	ASN
1	C	639	GLN
1	C	653	GLN

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
2	B	9/10 (90%)	0	0
2	D	9/10 (90%)	0	0
2	F	9/10 (90%)	0	0
All	All	27/30 (90%)	0	0

There are no RNA backbone outliers to report.

There are no RNA pucker outliers to report.

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 oligosaccharides 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, 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	343/369 (92%)	0.12	5 (1%) 72 52	21, 52, 125, 146	0
1	C	343/369 (92%)	0.22	10 (2%) 53 35	23, 51, 127, 148	0
1	E	343/369 (92%)	0.19	7 (2%) 65 45	22, 50, 123, 142	0
2	B	10/10 (100%)	0.52	0 100 100	58, 77, 104, 111	0
2	D	10/10 (100%)	0.61	0 100 100	59, 78, 104, 110	0
2	F	10/10 (100%)	0.35	0 100 100	59, 77, 103, 109	0
All	All	1059/1137 (93%)	0.19	22 (2%) 63 43	21, 52, 126, 148	0

The worst 5 of 22 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	518	LEU	3.2
1	A	524	SER	3.0
1	A	870	LEU	3.0
1	C	515	SER	2.9
1	A	864	LEU	2.9

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 oligosaccharides 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.