W O R L D W I D E
wwPDB
P R O T E I N   D A T A   B A N K

wwPDB NMR Structure Validation Summary Report ⓘ

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PDB ID	:	2EVZ
Title	:	Structure of RNA Binding Domains 3 and 4 of Polypyrimidine Tract Binding Protein
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1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:
SOLUTION NMR

The overall completeness of chemical shifts assignment was not calculated.

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	Percentile Ranks	Value
Clashscore		4
Ramachandran outliers		7.8%
Sidechain outliers		21.1%

Worse   *Better*

▮ Percentile relative to all structures
▯ Percentile relative to all NMR structures
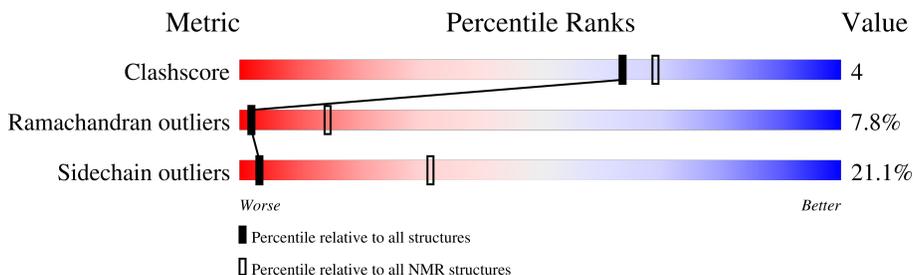
Metric	Whole archive (#Entries)	NMR archive (#Entries)
Clashscore	158937	12864
Ramachandran outliers	154571	11451
Sidechain outliers	154315	11428

The table below summarises the geometric issues observed across the polymeric chains and their fit to the experimental data. The red, orange, yellow and green segments indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria. A cyan segment indicates the fraction of residues that are not part of the well-defined cores, and 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 <=5%

Mol	Chain	Length	Quality of chain
1	A	229	44% 24% • 20% 9%

2 Ensemble composition and analysis ⓘ

This entry contains 20 models. Model 18 is the overall representative, medoid model (most similar to other models). The authors have identified model 1 as representative, based on the following criterion: *lowest energy.*

The following residues are included in the computation of the global validation metrics.

Well-defined (core) protein residues			
Well-defined core	Residue range (total)	Backbone RMSD (Å)	Medoid model
1	A:13-A:47, A:52-A:91, A:104-A:108, A:126-A:208 (163)	0.39	18

Ill-defined regions of proteins are excluded from the global statistics.

Ligands and non-protein polymers are included in the analysis.

The models can be grouped into 4 clusters and 3 single-model clusters were found.

Cluster number	Models
1	2, 3, 7, 8, 10, 12, 13, 14, 16, 17, 18
2	4, 6
3	5, 15
4	9, 11
Single-model clusters	1; 19; 20

3 Entry composition ⓘ

There is only 1 type of molecule in this entry. The entry contains 3259 atoms, of which 1641 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called Polypyrimidine tract-binding protein 1.

Mol	Chain	Residues	Atoms						Trace
			Total	C	H	N	O	S	
1	A	208	3259	1023	1641	296	295	4	0

There are 21 discrepancies between the modelled and reference sequences:

| Chain	Residue	Modelled	Actual	Comment	Reference
A	-20	MET	-	cloning artifact	UNP P26599
A	-19	GLY	-	cloning artifact	UNP P26599
A	-18	SER	-	cloning artifact	UNP P26599
A	-17	SER	-	cloning artifact	UNP P26599
A	-16	HIS	-	expression tag	UNP P26599
A	-15	HIS	-	expression tag	UNP P26599
A	-14	HIS	-	expression tag	UNP P26599
A	-13	HIS	-	expression tag	UNP P26599
A	-12	HIS	-	expression tag	UNP P26599
A	-11	HIS	-	expression tag	UNP P26599
A	-10	SER	-	cloning artifact	UNP P26599
A	-9	SER	-	cloning artifact	UNP P26599
A	-8	GLY	-	cloning artifact	UNP P26599
A	-7	LEU	-	cloning artifact	UNP P26599
A	-6	VAL	-	cloning artifact	UNP P26599
A	-5	PRO	-	cloning artifact	UNP P26599
A	-4	ARG	-	cloning artifact	UNP P26599
A	-3	GLY	-	cloning artifact	UNP P26599
A	-2	SER	-	cloning artifact	UNP P26599
A	-1	HIS	-	cloning artifact	UNP P26599
A	0	MET	-	cloning artifact	UNP P26599

4 Residue-property plots ⓘ

4.1 Average score per residue in the NMR ensemble

These plots are provided for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic is the same as shown in the summary in section 1 of this report. The second graphic shows the sequence where residues are colour-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. Stretches of 2 or more consecutive residues without any outliers are shown as green connectors. Residues which are classified as ill-defined in the NMR ensemble, are shown in cyan with an underline colour-coded according to the previous scheme. Residues which were present in the experimental sample, but not modelled in the final structure are shown in grey.

• Molecule 1: Polypyrimidine tract-binding protein 1
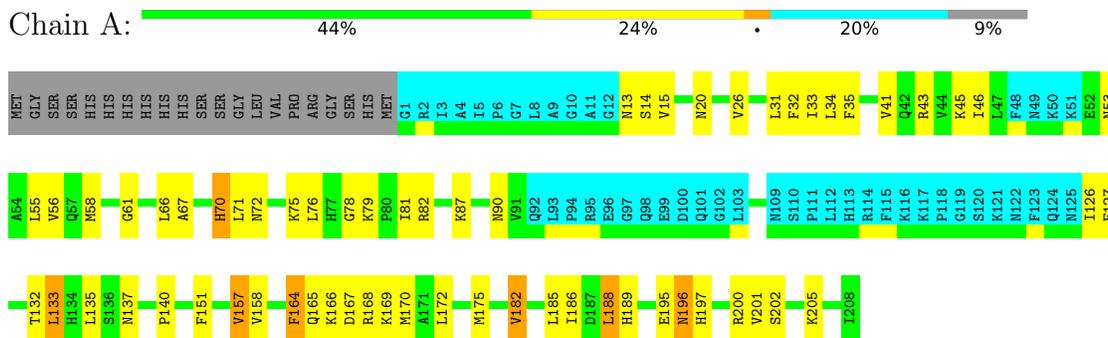
4.2 Residue scores for the representative (medoid) model from the NMR ensemble

The representative model is number 18. Colouring as in section 4.1 above.

• Molecule 1: Polypyrimidine tract-binding protein 1
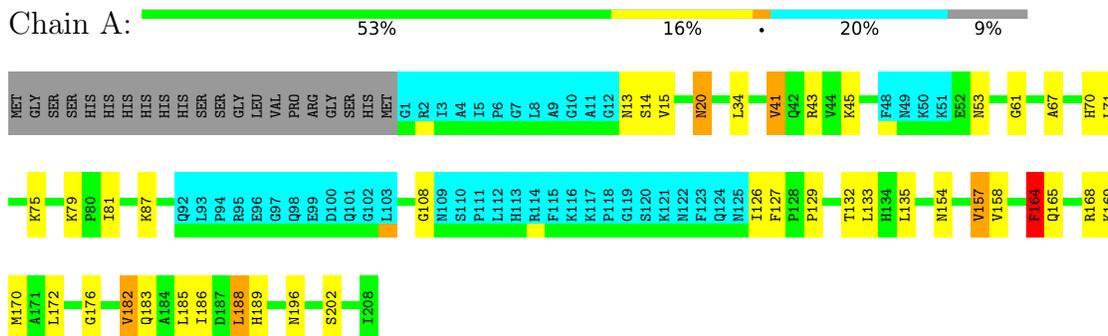
5 Refinement protocol and experimental data overview ⓘ

The models were refined using the following method: *torsion angle dynamics simulated annealing.*

Of the 30 calculated structures, 20 were deposited, based on the following criterion: *structures with the least restraint violations.*

The following table shows the software used for structure solution, optimisation and refinement.

Software name	Classification	Version
CYANA	structure solution	2.0
Amber	refinement	7.0

No chemical shift data was provided.

6 Model quality ⓘ

6.1 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 (average) 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	0.99±0.83	18±44/1297 (1.4± 3.4%)	1.64±0.89	46±95/1751 (2.6± 5.4%)
All	All	1.29	365/25940 (1.4%)	1.86	918/35020 (2.6%)

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	Planarity
1	A	0.0±0.0	6.8±16.1
All	All	0	137

5 of 318 unique bond outliers are listed below. They are sorted according to the Z-score of the worst occurrence in the ensemble.

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)	Models	
								Worst	Total
1	A	160	GLY	N-CA	-12.51	1.27	1.46	19	1
1	A	140	PRO	N-CA	12.44	1.68	1.47	19	2
1	A	166	LYS	CD-CE	11.90	1.81	1.51	1	1
1	A	38	TYR	CE2-CZ	11.48	1.53	1.38	19	1
1	A	44	VAL	CA-CB	-11.38	1.30	1.54	1	1

5 of 641 unique angle outliers are listed below. They are sorted according to the Z-score of the worst occurrence in the ensemble.

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})	Models	
								Worst	Total
1	A	43	ARG	NE-CZ-NH2	27.77	134.18	120.30	20	6
1	A	188	LEU	CB-CG-CD1	22.11	148.58	111.00	19	2
1	A	107	TYR	CB-CG-CD2	22.01	134.21	121.00	20	3
1	A	163	PHE	CB-CG-CD1	-20.51	106.45	120.80	20	2
1	A	32	PHE	CB-CG-CD1	19.39	134.37	120.80	1	2

There are no chirality outliers.

5 of 87 unique planar outliers are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type	Group	Models (Total)
1	A	38	TYR	Sidechain	3
1	A	70	HIS	Mainchain,Sidechain	3
1	A	74	HIS	Sidechain,Mainchain	3
1	A	77	HIS	Sidechain	3
1	A	163	PHE	Sidechain,Mainchain	3

6.2 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 each 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 averaged over the ensemble.

Mol	Chain	Non-H	H(model)	H(added)	Clashes
1	A	1272	1291	1285	11±15
All	All	25440	25820	25801	218

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 4.

5 of 144 unique clashes are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models Worst	Total
1:A:166:LYS:CD	1:A:166:LYS:CE	1.55	1.81	1	1
1:A:58:MET:SD	1:A:58:MET:CG	1.47	2.01	19	1
1:A:170:MET:CE	1:A:170:MET:SD	1.43	2.07	1	1
1:A:140:PRO:N	1:A:140:PRO:CA	1.42	1.68	19	1
1:A:73:GLY:HA2	1:A:81:ILE:HD11	0.93	1.37	1	4

6.3 Torsion angles ⓘ

6.3.1 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 PDB entries followed by that with respect to all NMR entries. 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	162/229 (71%)	125±7 (77±4%)	24±4 (15±2%)	13±5 (8±3%)	2	14
All	All	3240/4580 (71%)	2502 (77%)	484 (15%)	254 (8%)	2	14

5 of 59 unique Ramachandran outliers are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type	Models (Total)
1	A	158	VAL	19
1	A	127	PHE	15
1	A	15	VAL	14
1	A	165	GLN	14
1	A	61	GLY	13

6.3.2 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 PDB entries followed by that with respect to all NMR entries. 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	144/197 (73%)	114±10 (79±7%)	30±10 (21±7%)	3	32
All	All	2880/3940 (73%)	2273 (79%)	607 (21%)	3	32

5 of 99 unique residues with a non-rotameric sidechain are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type	Models (Total)
1	A	79	LYS	20
1	A	133	LEU	20
1	A	135	LEU	20
1	A	188	LEU	20
1	A	34	LEU	19

6.3.3 RNA ⓘ

There are no RNA molecules in this entry.

6.4   Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

6.5   Carbohydrates ⓘ

There are no monosaccharides in this entry.

6.6   Ligand geometry ⓘ

There are no ligands in this entry.

6.7   Other polymers ⓘ

There are no such molecules in this entry.

6.8   Polymer linkage issues ⓘ

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	19-A	2
1	1-A	1
1	20-A	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	A	45:LYS	C	46:ILE	N	1.20
20	A	13:ASN	C	14:SER	N	1.20
19	A	34:LEU	C	35:PHE	N	1.18
19	A	169:LYS	C	170:MET	N	1.16

7 Chemical shift validation (i)

No chemical shift data were provided