wwPDB NMR Structure Validation Summary Report (i)

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PDB ID	:	2DNL
Title	:	Solution structure of RNA binding domain in Cytoplasmic polyadenylation element binding protein 3
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This is a wwPDB NMR 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/NMRValidationReportHelp
with specific help available everywhere you see the (i) symbol.

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

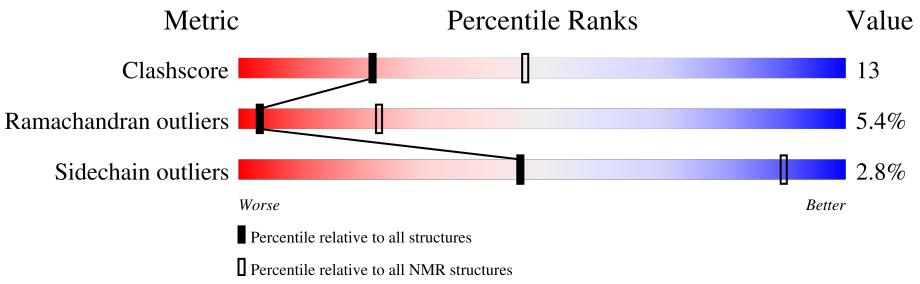
MolProbity	:	4.02b-467
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
RCI	:	v_1n_11_5_13_A (Berjanski et al., 2005)
PANAV	:	Wang et al. (2010)
ShiftChecker	:	2.27
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.27

1 Overall quality at a glance (i)

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	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	114	59% 19% • 20%

2 Ensemble composition and analysis (i)

This entry contains 20 models. Model 14 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:426-A:516 (91)	0.35	14

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 3 clusters and 2 single-model clusters were found.

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

3 Entry composition (i)

There is only 1 type of molecule in this entry. The entry contains 1716 atoms, of which 841 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called cytoplasmic polyadenylation element binding protein 3.

Mol	Chain	Residues	Atoms						Trace
			Total	C	H	N	O	S	
1	A	114	1716	557	841	141	174	3	0

There are 13 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	419	GLY	-	cloning artifact	UNP Q5T390
A	420	SER	-	cloning artifact	UNP Q5T390
A	421	SER	-	cloning artifact	UNP Q5T390
A	422	GLY	-	cloning artifact	UNP Q5T390
A	423	SER	-	cloning artifact	UNP Q5T390
A	424	SER	-	cloning artifact	UNP Q5T390
A	425	GLY	-	cloning artifact	UNP Q5T390
A	527	SER	-	cloning artifact	UNP Q5T390
A	528	GLY	-	cloning artifact	UNP Q5T390
A	529	PRO	-	cloning artifact	UNP Q5T390
A	530	SER	-	cloning artifact	UNP Q5T390
A	531	SER	-	cloning artifact	UNP Q5T390
A	532	GLY	-	cloning artifact	UNP Q5T390

4 Residue-property plots (i)

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: cytoplasmic polyadenylation element binding protein 3

Chain A: 59% 19% • 20%

G419 S420 S421 G422 S423 S424 G425 K428 P435 I438 D439 E440 D441 E442 R448 R449 F450 W457 K460 P468 P469 K470 G471 Y472 L486 L491 L497 Y498 V501 K507 D508 P515 W516 N517 L518 S519 D520 S521 D522 F523 V524 M525 D526 S527 G528 P529 S530

S531 G532

4.2 Residue scores for the representative (medoid) model from the NMR ensemble

The representative model is number 14. Colouring as in section 4.1 above.

• Molecule 1: cytoplasmic polyadenylation element binding protein 3

Chain A: 56% 18% 5% 20%

G419 S420 S421 G422 S423 S424 G425 P435 I438 D439 E440 D441 E442 I443 T444 F447 R448 G451 P452 L453 W457 E462 S463 P468 P469 K470 G471 Y472 L491 L499 S503 I506 K507 D508 V511 R514 P515 W516 N517 L518 S519 D520 S521 D522 F523 V524 M525

D526 S527 G528 P529 S530 S531 G532

5 Refinement protocol and experimental data overview (i)

The models were refined using the following method: *torsion angle dynamics,restrainted molecular dynamics*.

Of the 100 calculated structures, 20 were deposited, based on the following criterion: *target function,structures with the lowest energy,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	2.0.17
CYANA	refinement	2.0.17

No chemical shift data was provided.

6 Model quality (i)

6.1 Standard geometry (i)

There are no covalent bond-length or bond-angle outliers.

There are no bond-length outliers.

There are no bond-angle outliers.

There are no chirality outliers.

There are no planarity outliers.

6.2 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 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	728	718	718	18±4
All	All	14560	14360	14360	369

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 13.

5 of 140 unique clashes are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:499:LEU:O	1:A:511:VAL:HG22	0.71	1.85	14	6
1:A:487:ILE:HG23	1:A:497:LEU:HD11	0.70	1.61	7	4
1:A:450:PHE:CE2	1:A:486:LEU:CD1	0.68	2.77	2	6
1:A:429:VAL:CG1	1:A:513:ILE:HG23	0.65	2.22	19	4
1:A:450:PHE:CE2	1:A:486:LEU:HD12	0.65	2.27	2	9

6.3 Torsion angles (i)

6.3.1 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 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	91/114 (80%)	69±3 (76±4%)	17±3 (18±4%)	5±1 (5±1%)	3 23
All	All	1820/2280 (80%)	1386 (76%)	335 (18%)	99 (5%)	3 23

5 of 15 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	515	PRO	17
1	A	471	GLY	13
1	A	469	PRO	13
1	A	468	PRO	12
1	A	508	ASP	12

6.3.2 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 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	81/99 (82%)	79±1 (97±2%)	2±1 (3±2%)	46 90
All	All	1620/1980 (82%)	1574 (97%)	46 (3%)	46 90

5 of 16 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	508	ASP	7
1	A	464	LYS	7
1	A	470	LYS	4
1	A	509	LYS	4
1	A	456	ASP	3

6.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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

6.5 Carbohydrates (i)

There are no monosaccharides in this entry.

6.6 Ligand geometry (i)

There are no ligands in this entry.

6.7 Other polymers (i)

There are no such molecules in this entry.

6.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

7 Chemical shift validation (i)

No chemical shift data were provided