



Full wwPDB NMR Structure Validation Report ⓘ

Aug 17, 2021 – 12:09 PM EDT

PDB ID : 7LP5
Title : Structure of Nedd4L WW3 domain
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Deposited on : 2021-02-11

This is a Full wwPDB NMR Structure Validation 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 ⓘ symbol.

The following versions of software and data (see [references ⓘ](#)) 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 : 2.23.1
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.23.1

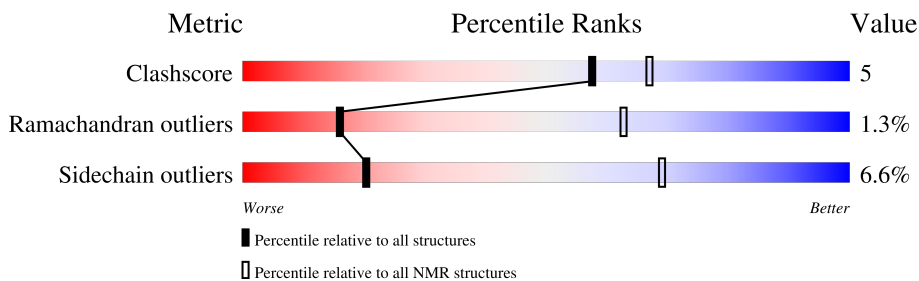
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

SOLUTION NMR

The overall completeness of chemical shifts assignment is 87%.

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 $\leq 5\%$

Mol	Chain	Length	Quality of chain
1	A	68	

2 Ensemble composition and analysis

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

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:102-A:115, A:201-A:206, A:493-A:534 (62)	0.64	20

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 5 clusters and 3 single-model clusters were found.

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

3 Entry composition

There is only 1 type of molecule in this entry. The entry contains 1016 atoms, of which 470 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called Angiomotin,E3 ubiquitin-protein ligase NEDD4-like.

Mol	Chain	Residues	Atoms						Trace
			Total	C	H	N	O	S	
1	A	68	1016	345	470	97	101	3	0

There are 6 discrepancies between the modelled and reference sequences:

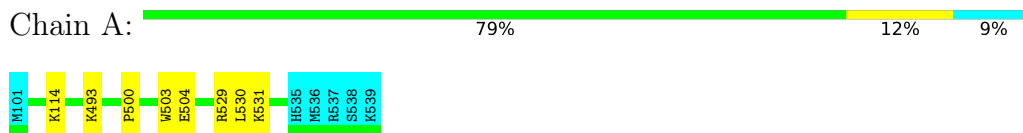
Chain	Residue	Modelled	Actual	Comment	Reference
A	201	GLY	-	linker	UNP Q4VCS5
A	202	GLY	-	linker	UNP Q4VCS5
A	203	GLY	-	linker	UNP Q4VCS5
A	204	GLY	-	linker	UNP Q4VCS5
A	205	GLY	-	linker	UNP Q4VCS5
A	206	SER	-	linker	UNP Q4VCS5

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: Angiotensinogen, E3 ubiquitin-protein ligase NEDD4-like

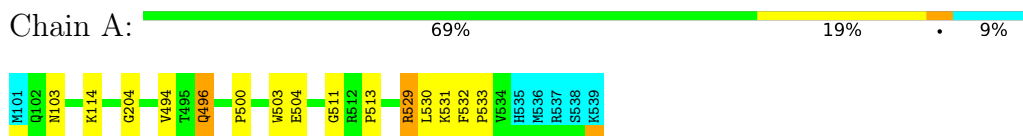


4.2 Scores per residue for each member of the ensemble

Colouring as in section 4.1 above.

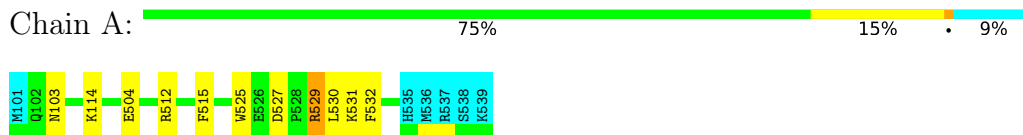
4.2.1 Score per residue for model 1

- Molecule 1: Angiotensinogen, E3 ubiquitin-protein ligase NEDD4-like



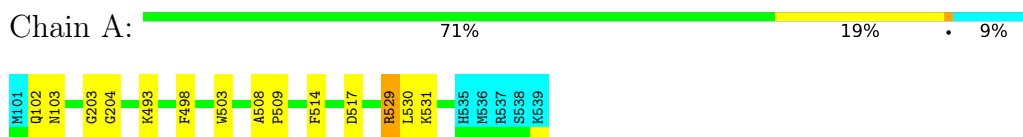
4.2.2 Score per residue for model 2

- Molecule 1: Angiotensinogen, E3 ubiquitin-protein ligase NEDD4-like



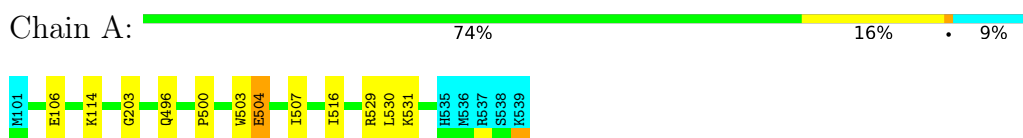
4.2.3 Score per residue for model 3

- Molecule 1: Angiotensin, E3 ubiquitin-protein ligase NEDD4-like



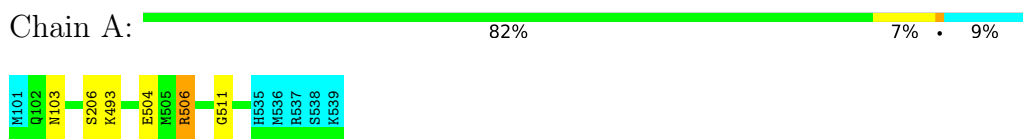
4.2.4 Score per residue for model 4

- Molecule 1: Angiotensin, E3 ubiquitin-protein ligase NEDD4-like



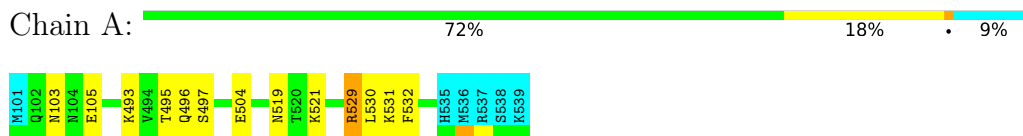
4.2.5 Score per residue for model 5

- Molecule 1: Angiotensin, E3 ubiquitin-protein ligase NEDD4-like



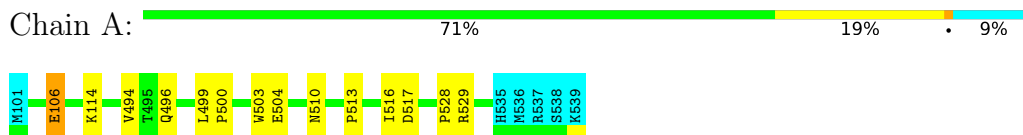
4.2.6 Score per residue for model 6

- Molecule 1: Angiotensin, E3 ubiquitin-protein ligase NEDD4-like



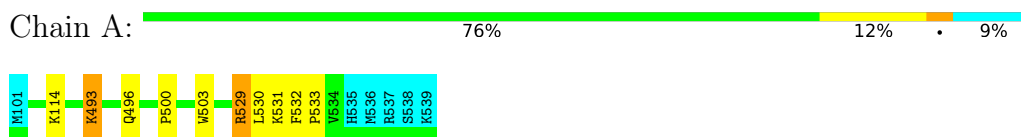
4.2.7 Score per residue for model 7

- Molecule 1: Angiotensin, E3 ubiquitin-protein ligase NEDD4-like



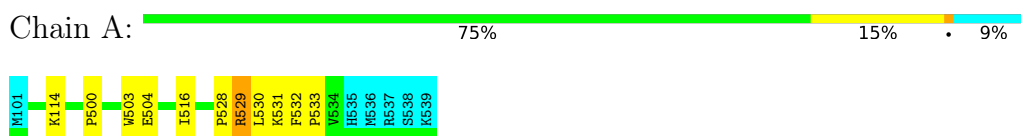
4.2.8 Score per residue for model 8

- Molecule 1: Angiotensin, E3 ubiquitin-protein ligase NEDD4-like



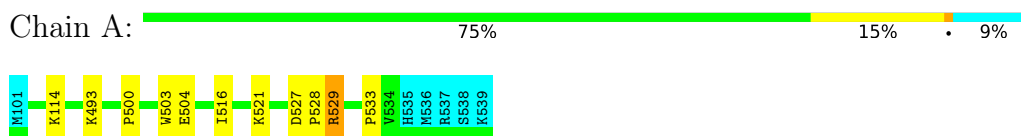
4.2.9 Score per residue for model 9

- Molecule 1: Angiotensin, E3 ubiquitin-protein ligase NEDD4-like



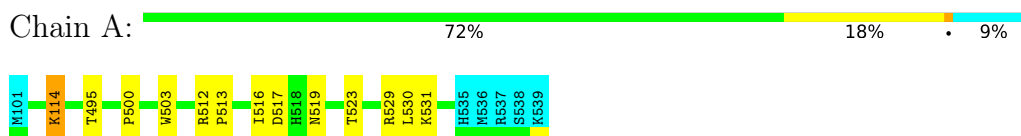
4.2.10 Score per residue for model 10

- Molecule 1: Angiotensin, E3 ubiquitin-protein ligase NEDD4-like



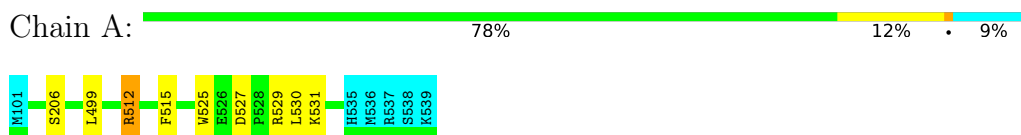
4.2.11 Score per residue for model 11

- Molecule 1: Angiotensin, E3 ubiquitin-protein ligase NEDD4-like



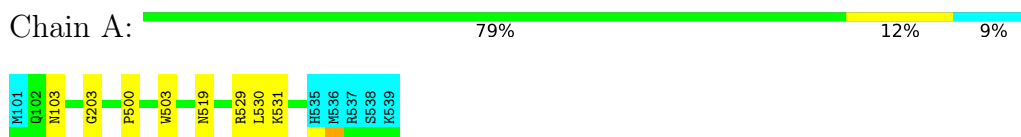
4.2.12 Score per residue for model 12

- Molecule 1: Angiotensin, E3 ubiquitin-protein ligase NEDD4-like



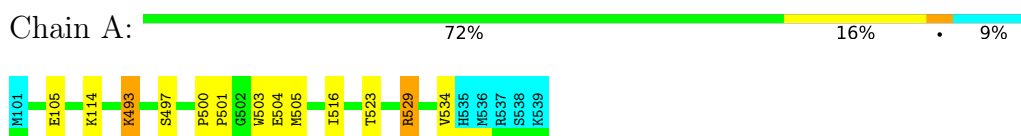
4.2.13 Score per residue for model 13

- Molecule 1: Angiotensin, E3 ubiquitin-protein ligase NEDD4-like



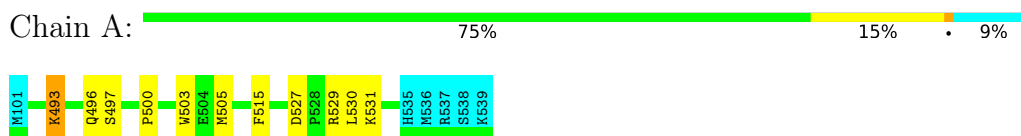
4.2.14 Score per residue for model 14

- Molecule 1: Angiotensin, E3 ubiquitin-protein ligase NEDD4-like



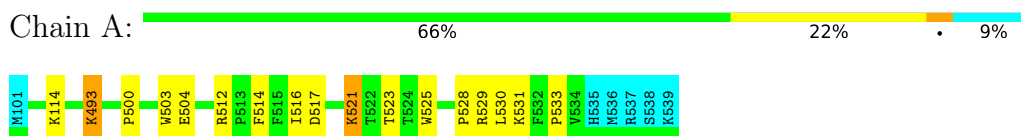
4.2.15 Score per residue for model 15

- Molecule 1: Angiotensin, E3 ubiquitin-protein ligase NEDD4-like



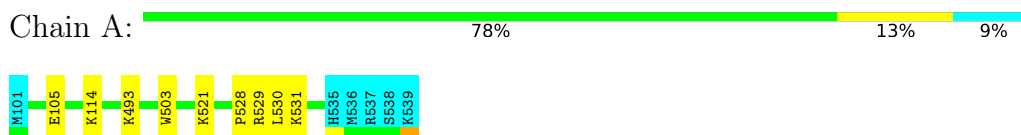
4.2.16 Score per residue for model 16

- Molecule 1: Angiotensin, E3 ubiquitin-protein ligase NEDD4-like



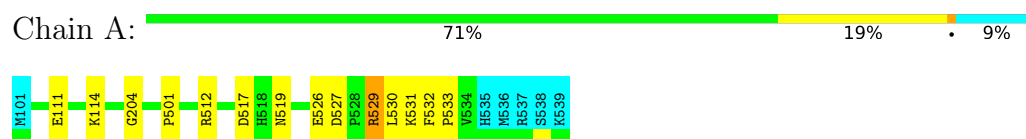
4.2.17 Score per residue for model 17

- Molecule 1: Angiotensin, E3 ubiquitin-protein ligase NEDD4-like



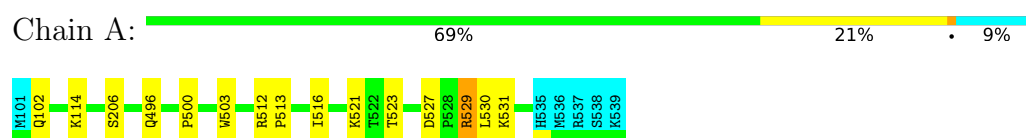
4.2.18 Score per residue for model 18

- Molecule 1: Angiotensin, E3 ubiquitin-protein ligase NEDD4-like



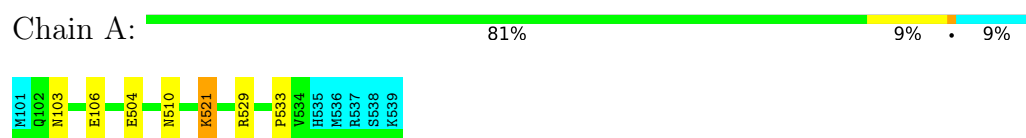
4.2.19 Score per residue for model 19

- Molecule 1: Angiotensin, E3 ubiquitin-protein ligase NEDD4-like



4.2.20 Score per residue for model 20 (medoid)

- Molecule 1: Angiotensin, E3 ubiquitin-protein ligase NEDD4-like



5 Refinement protocol and experimental data overview

The models were refined using the following method: *DGSA-distance geometry simulated annealing*.

Of the 100 calculated structures, 20 were deposited, based on the following criterion: *target function*.

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

Software name	Classification	Version
CYANA	refinement	
X-PLOR NIH	refinement	

The following table shows chemical shift validation statistics as aggregates over all chemical shift files. Detailed validation can be found in section 7 of this report.

Chemical shift file(s)	working_cs.cif
Number of chemical shift lists	1
Total number of shifts	786
Number of shifts mapped to atoms	786
Number of unparsed shifts	0
Number of shifts with mapping errors	0
Number of shifts with mapping warnings	0
Assignment completeness (well-defined parts)	87%

6 Model quality i

6.1 Standard geometry i

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

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	0.1±0.2
All	All	0	1

There are no bond-length outliers.

There are no bond-angle outliers.

There are no chirality outliers.

All unique planar outliers are listed below.

Mol	Chain	Res	Type	Group	Models (Total)
1	A	529	ARG	Sidechain	1

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	493	413	470	5±2
All	All	9860	8260	9400	96

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 5.

All unique clashes are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:494:VAL:HG21	1:A:513:PRO:HD3	0.64	1.70	7	1
1:A:500:PRO:HG2	1:A:503:TRP:CD1	0.61	2.29	19	10

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:529:ARG:HA	1:A:532:PHE:O	0.60	1.97	18	6
1:A:503:TRP:CZ2	1:A:528:PRO:HG3	0.60	2.31	17	4
1:A:503:TRP:CE2	1:A:528:PRO:HG3	0.57	2.34	10	2
1:A:504:GLU:HB3	1:A:516:ILE:HB	0.57	1.76	14	5
1:A:493:LYS:O	1:A:493:LYS:HD2	0.57	2.00	16	3
1:A:497:SER:HA	1:A:505:MET:SD	0.56	2.41	14	1
1:A:530:LEU:HD12	1:A:531:LYS:N	0.54	2.17	16	13
1:A:527:ASP:OD2	1:A:529:ARG:HG3	0.53	2.03	18	1
1:A:514:PHE:HB3	1:A:525:TRP:CZ3	0.52	2.39	16	1
1:A:512:ARG:HD2	1:A:525:TRP:CE3	0.52	2.40	2	1
1:A:203:GLY:O	1:A:509:PRO:HA	0.50	2.06	3	1
1:A:512:ARG:HG2	1:A:513:PRO:HD2	0.49	1.82	19	1
1:A:503:TRP:HA	1:A:516:ILE:O	0.49	2.06	10	2
1:A:500:PRO:HB2	1:A:533:PRO:O	0.48	2.08	10	1
1:A:206:SER:OG	1:A:511:GLY:HA2	0.48	2.09	5	1
1:A:495:THR:O	1:A:496:GLN:HG2	0.48	2.08	6	1
1:A:503:TRP:CZ3	1:A:517:ASP:HB2	0.47	2.45	7	3
1:A:496:GLN:HE21	1:A:496:GLN:N	0.47	2.07	1	1
1:A:106:GLU:HB3	1:A:510:ASN:ND2	0.47	2.24	20	2
1:A:512:ARG:HB3	1:A:525:TRP:CZ3	0.47	2.45	16	1
1:A:203:GLY:HA2	1:A:507:ILE:O	0.47	2.10	4	1
1:A:501:PRO:HD2	1:A:533:PRO:O	0.46	2.11	18	1
1:A:111:GLU:O	1:A:114:LYS:HB3	0.45	2.12	18	1
1:A:527:ASP:OD2	1:A:529:ARG:HB3	0.45	2.12	19	1
1:A:516:ILE:HG13	1:A:523:THR:HG22	0.44	1.89	14	3
1:A:102:GLN:OE1	1:A:102:GLN:HA	0.43	2.12	3	1
1:A:516:ILE:HG12	1:A:523:THR:HG22	0.43	1.90	11	1
1:A:512:ARG:NH1	1:A:525:TRP:HB3	0.43	2.28	12	1
1:A:517:ASP:OD1	1:A:519:ASN:HB2	0.42	2.14	18	2
1:A:500:PRO:HG2	1:A:503:TRP:CG	0.42	2.49	14	1
1:A:515:PHE:CZ	1:A:527:ASP:HB3	0.42	2.50	12	3
1:A:530:LEU:CD1	1:A:531:LYS:HG3	0.42	2.44	18	2
1:A:204:GLY:O	1:A:511:GLY:HA2	0.41	2.15	1	1
1:A:499:LEU:O	1:A:499:LEU:HD12	0.41	2.15	12	2
1:A:114:LYS:C	1:A:114:LYS:HD3	0.41	2.35	11	2
1:A:527:ASP:HB2	1:A:529:ARG:NH1	0.41	2.30	10	1
1:A:521:LYS:HB2	1:A:521:LYS:NZ	0.41	2.31	16	1
1:A:494:VAL:HA	1:A:513:PRO:HD3	0.41	1.91	1	1
1:A:506:ARG:HA	1:A:506:ARG:NE	0.41	2.30	5	1
1:A:495:THR:O	1:A:513:PRO:HG3	0.41	2.16	11	1
1:A:497:SER:OG	1:A:505:MET:HG3	0.41	2.15	15	1

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:508:ALA:HB2	1:A:514:PHE:CD1	0.41	2.51	3	1
1:A:496:GLN:NE2	1:A:496:GLN:H	0.41	2.14	19	1
1:A:493:LYS:HD3	1:A:493:LYS:H	0.40	1.75	8	1
1:A:521:LYS:NZ	1:A:521:LYS:HB2	0.40	2.31	20	1
1:A:498:PHE:O	1:A:529:ARG:HG3	0.40	2.16	3	1

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	62/68 (91%)	56±1 (91±2%)	5±1 (8±2%)	1±1 (1±1%)	16	63
All	All	1240/1360 (91%)	1127 (91%)	97 (8%)	16 (1%)	16	63

All 8 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	533	PRO	5
1	A	103	ASN	3
1	A	204	GLY	2
1	A	206	SER	2
1	A	497	SER	1
1	A	106	GLU	1
1	A	203	GLY	1
1	A	534	VAL	1

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	53/59 (90%)	50±1 (93±2%)	4±1 (7±2%)	20	69
All	All	1060/1180 (90%)	990 (93%)	70 (7%)	20	69

All 13 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	529	ARG	19
1	A	114	LYS	11
1	A	493	LYS	9
1	A	504	GLU	7
1	A	521	LYS	6
1	A	496	GLN	5
1	A	103	ASN	3
1	A	105	GLU	3
1	A	512	ARG	3
1	A	106	GLU	1
1	A	506	ARG	1
1	A	526	GLU	1
1	A	102	GLN	1

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](#)

The completeness of assignment taking into account all chemical shift lists is 87% for the well-defined parts and 84% for the entire structure.

7.1 Chemical shift list 1

File name: working_cs.cif

Chemical shift list name: *NPY1_star3.2*

7.1.1 Bookkeeping [i](#)

The following table shows the results of parsing the chemical shift list and reports the number of nuclei with statistically unusual chemical shifts.

Total number of shifts	786
Number of shifts mapped to atoms	786
Number of unparsed shifts	0
Number of shifts with mapping errors	0
Number of shifts with mapping warnings	0
Number of shift outliers (ShiftChecker)	13

7.1.2 Chemical shift referencing [i](#)

The following table shows the suggested chemical shift referencing corrections.

Nucleus	# values	Correction \pm precision, ppm	Suggested action
$^{13}\text{C}_\alpha$	66	0.33 \pm 0.18	None needed (< 0.5 ppm)
$^{13}\text{C}_\beta$	61	0.40 \pm 0.17	None needed (< 0.5 ppm)
$^{13}\text{C}'$	55	0.25 \pm 0.13	None needed (< 0.5 ppm)
^{15}N	55	0.07 \pm 0.30	None needed (< 0.5 ppm)

7.1.3 Completeness of resonance assignments [i](#)

The following table shows the completeness of the chemical shift assignments for the well-defined regions of the structure. The overall completeness is 87%, i.e. 670 atoms were assigned a chemical shift out of a possible 768. 6 out of 6 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	^1H	^{13}C	^{15}N
Backbone	273/296 (92%)	110/117 (94%)	112/124 (90%)	51/55 (93%)
Sidechain	339/396 (86%)	214/236 (91%)	116/141 (82%)	9/19 (47%)

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	Total	¹ H	¹³ C	¹⁵ N
Aromatic	58/76 (76%)	36/40 (90%)	20/32 (62%)	2/4 (50%)
Overall	670/768 (87%)	360/393 (92%)	248/297 (84%)	62/78 (79%)

The following table shows the completeness of the chemical shift assignments for the full structure. The overall completeness is 84%, i.e. 720 atoms were assigned a chemical shift out of a possible 859. 6 out of 6 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	¹ H	¹³ C	¹⁵ N
Backbone	295/326 (90%)	119/129 (92%)	121/136 (89%)	55/61 (90%)
Sidechain	365/449 (81%)	230/269 (86%)	126/157 (80%)	9/23 (39%)
Aromatic	60/84 (71%)	37/44 (84%)	21/34 (62%)	2/6 (33%)
Overall	720/859 (84%)	386/442 (87%)	268/327 (82%)	66/90 (73%)

7.1.4 Statistically unusual chemical shifts [i](#)

The following table lists the statistically unusual chemical shifts. These are statistical measures, and large deviations from the mean do not necessarily imply incorrect assignments. Molecules containing paramagnetic centres or hemes are expected to give rise to anomalous chemical shifts.

Mol	Chain	Res	Type	Atom	Shift, ppm	Expected range, ppm	Z-score
1	A	102	GLN	HE21	0.00	9.53 – 4.93	-15.7
1	A	102	GLN	HE22	0.00	9.27 – 4.77	-15.6
1	A	102	GLN	HA	0.00	6.41 – 2.11	-9.9
1	A	517	ASP	HB2	0.10	4.07 – 1.37	-9.7
1	A	102	GLN	HG2	0.00	3.67 – 0.97	-8.6
1	A	102	GLN	HB2	0.00	3.30 – 0.80	-8.2
1	A	102	GLN	HG3	0.00	3.75 – 0.85	-7.9
1	A	102	GLN	HB3	0.00	3.37 – 0.67	-7.5
1	A	527	ASP	HA	2.59	6.15 – 3.05	-6.5
1	A	107	LEU	HD11	-0.72	2.16 – -0.64	-5.3
1	A	107	LEU	HD12	-0.72	2.16 – -0.64	-5.3
1	A	107	LEU	HD13	-0.72	2.16 – -0.64	-5.3
1	A	108	PRO	HD3	1.64	5.52 – 1.72	-5.2

7.1.5 Random Coil Index (RCI) plots [i](#)

The image below reports *random coil index* values for the protein chains in the structure. The height of each bar gives a probability of a given residue to be disordered, as predicted from the available chemical shifts and the amino acid sequence. A value above 0.2 is an indication of significant predicted disorder. The colour of the bar shows whether the residue is in the well-defined core (black) or in the ill-defined residue ranges (cyan), as described in section 2 on ensemble composition.

Random coil index (RCI) for chain A:

