Full wwPDB NMR Structure Validation Report (i)

Jun 12, 2024 – 08:37 PM EDT

PDB ID	:	1AHL
Title	:	ANTHOPLEURIN-A,NMR, 20 STRUCTURES
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Deposited on	:	1994-10-28

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 (i) 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 (i)) were used in the production of this report:

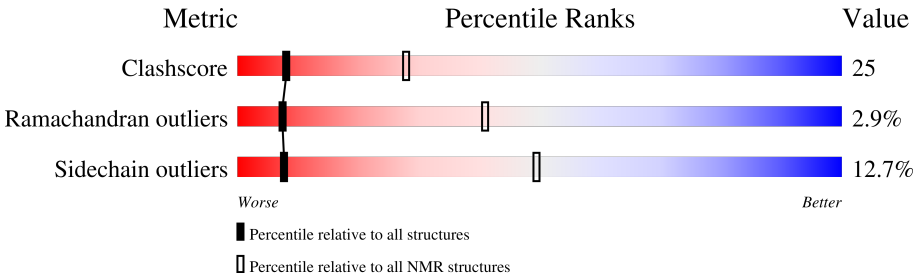
MolProbity	:	4.02b-467
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
wwPDB-RCI	:	v_1n_11_5_13_A (Berjanski et al., 2005)
PANAV	:	Wang et al. (2010)
wwPDB-ShiftChecker	:	v1.2
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36.2

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	49	39% 29% 8% 24%

2 Ensemble composition and analysis (i)

This entry contains 20 models. Model 6 is the overall representative, medoid model (most similar to other models).

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:2-A:7, A:19-A:49 (37)	0.63	6

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 4 single-model clusters were found.

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

3 Entry composition (i)

There is only 1 type of molecule in this entry. The entry contains 684 atoms, of which 327 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called ANTHOPLEURIN-A.

Mol	Chain	Residues	Atoms						Trace
			Total	C	H	N	O	S	
1	A	49	684	220	327	64	67	6	0

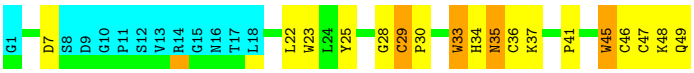
4 Residue-property plots (i)

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: ANTHOPLEURIN-A

Chain A: 39% 29% 8% 24%



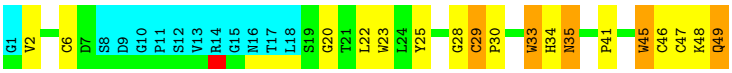
4.2 Scores per residue for each member of the ensemble

Colouring as in section 4.1 above.

4.2.1 Score per residue for model 1

• Molecule 1: ANTHOPLEURIN-A

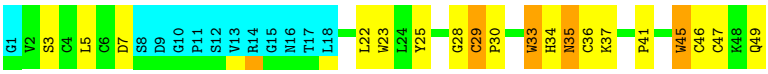
Chain A: 39% 27% 10% 24%



4.2.2 Score per residue for model 2

• Molecule 1: ANTHOPLEURIN-A

Chain A: 37% 31% 8% 24%



4.2.3 Score per residue for model 3

- Molecule 1: ANTHOPLEURIN-A

Chain A: 45% 18% 12% 24%

G1 V2 S3 C4 L5 C6 D7 S8 D9 G10 P11 S12 V13 R14 G15 N16 T17 L18 W23 G28 C29 P30 S31 G32 W33 H34 N35 C36 K37 W45 C46 C47 K48 Q49

4.2.4 Score per residue for model 4

- Molecule 1: ANTHOPLEURIN-A

Chain A: 43% 20% 12% 24%

G1 L5 C6 D7 S8 D9 G10 P11 S12 V13 R14 G15 N16 T17 L18 L22 W23 G28 C29 P30 W33 H34 N35 C36 K37 P41 W45 C46 C47 K48 Q49

4.2.5 Score per residue for model 5

- Molecule 1: ANTHOPLEURIN-A

Chain A: 39% 27% 10% 24%

G1 C4 L5 C6 D7 S8 D9 G10 P11 S12 V13 R14 G15 N16 T17 L18 L22 W23 L24 Y25 G28 C29 W33 H34 N35 C36 K37 P41 W45 C46 C47 K48 Q49

4.2.6 Score per residue for model 6 (medoid)

- Molecule 1: ANTHOPLEURIN-A

Chain A: 43% 24% 8% 24%

G1 C6 D7 S8 D9 G10 P11 S12 V13 R14 G15 N16 T17 L18 L22 W23 L24 Y25 C29 W33 H34 N35 C36 K37 P41 W45 C46 C47 K48 Q49

4.2.7 Score per residue for model 7

- Molecule 1: ANTHOPLEURIN-A

Chain A: 35% 27% 14% 24%

G1 C4 L5 C6 D7 S8 D9 G10 P11 S12 V13 R14 G15 N16 T17 L18 S19 G20 T21 L22 W23 G28 C29 P30 W33 H34 N35 C36 P41 T42 I43 G44 W45 C46 C47 K48 Q49

4.2.8 Score per residue for model 8

- Molecule 1: ANTHOPLEURIN-A

Chain A: 41% 22% 12% 24%

G1 C4 L5 S8 D9 G10 P11 S12 V13 R14 G15 N16 T17 L18 L22 W23 G28 C29 P30 W33 H34 N35 C36 P41 T42 W45 C46 C47 K48 Q49

4.2.9 Score per residue for model 9

- Molecule 1: ANTHOPLEURIN-A

Chain A: 45% 18% 12% 24%

G1 S8 D9 G10 P11 S12 V13 R14 G15 N16 T17 L18 W23 L24 Y25 G28 C29 P30 S31 G32 W33 H34 N35 C36 K37 P41 W45 C46 C47 K48 Q49

4.2.10 Score per residue for model 10

- Molecule 1: ANTHOPLEURIN-A

Chain A: 41% 22% 12% 24%

G1 S8 D9 G10 P11 S12 V13 R14 G15 N16 T17 L18 S19 L22 W23 G28 C29 P30 S31 G32 W33 H34 N35 C36 K37 P41 W45 C46 C47 K48 Q49

4.2.11 Score per residue for model 11

- Molecule 1: ANTHOPLEURIN-A

Chain A: 45% 18% 10% • 24%

G1 V2 S3 C6 D7 S8 D9 G10 P11 S12 V13 R14 G15 N16 T17 L18 S19 G20 W23 L24 Y25 P26 S27 G28 C29 P30 W33 H34 N35 C36 W45 Q49

4.2.12 Score per residue for model 12

- Molecule 1: ANTHOPLEURIN-A

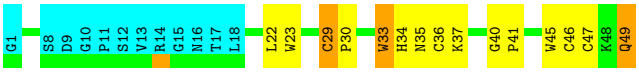
Chain A: 41% 24% 10% 24%

G1 S8 D9 G10 P11 S12 V13 R14 G15 N16 T17 L18 W23 L24 Y25 G28 C29 P30 S31 G32 W33 H34 N35 C36 K37 A38 P41 T42 I43 G44 W45 C46 C47 K48 Q49

4.2.13 Score per residue for model 13

- Molecule 1: ANTHOPLEURIN-A

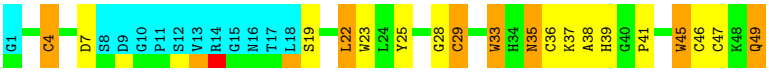
Chain A: 45% 24% 6% 24%



4.2.14 Score per residue for model 14

- Molecule 1: ANTHOPLEURIN-A

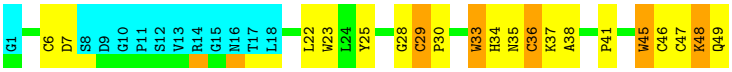
Chain A: 37% 24% 14% 24%



4.2.15 Score per residue for model 15

- Molecule 1: ANTHOPLEURIN-A

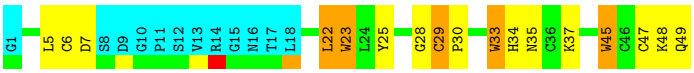
Chain A: 35% 31% 10% 24%



4.2.16 Score per residue for model 16

- Molecule 1: ANTHOPLEURIN-A

Chain A: 41% 24% 10% 24%



4.2.17 Score per residue for model 17

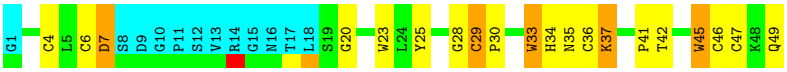
- Molecule 1: ANTHOPLEURIN-A

Chain A: 39% 27% 10% 24%

4.2.18 Score per residue for model 18

- Molecule 1: ANTHOPLEURIN-A

Chain A: 35% 31% 10% 24%



4.2.19 Score per residue for model 19

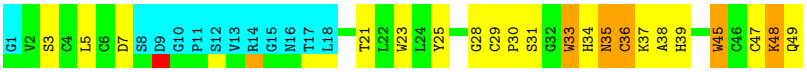
- Molecule 1: ANTHOPLEURIN-A

Chain A: 45% 22% 8% 24%

4.2.20 Score per residue for model 20

- Molecule 1: ANTHOPLEURIN-A

Chain A: 33% 33% 10% 24%



5 Refinement protocol and experimental data overview (i)

Of the ? calculated structures, 20 were deposited, based on the following criterion: *?*.

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

Software name	Classification	Version
X-PLOR	refinement	

No chemical shift data was provided.

6 Model quality (i)

6.1 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 (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	1.37±0.02	2±0/288 (0.6± 0.2%)	1.92±0.04	14±1/392 (3.6± 0.3%)
All	All	1.37	35/5760 (0.6%)	1.92	280/7840 (3.6%)

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	0.1±0.2
All	All	0	1

All 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	33	TRP	CG-CD2	-5.88	1.33	1.43	18	20
1	A	23	TRP	CG-CD2	-5.33	1.34	1.43	11	14
1	A	45	TRP	CG-CD2	-5.04	1.35	1.43	14	1

All 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	33	TRP	NE1-CE2-CZ2	10.52	141.97	130.40	19	20
1	A	33	TRP	CD1-NE1-CE2	9.90	117.91	109.00	9	20
1	A	45	TRP	CD1-NE1-CE2	9.26	117.34	109.00	6	20
1	A	23	TRP	CD1-NE1-CE2	8.69	116.82	109.00	16	20
1	A	33	TRP	CG-CD1-NE1	-8.41	101.69	110.10	18	20
1	A	23	TRP	NE1-CE2-CZ2	7.57	138.73	130.40	20	20
1	A	45	TRP	NE1-CE2-CZ2	7.45	138.59	130.40	8	20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)	Models	
								Worst	Total
1	A	45	TRP	CG-CD1-NE1	-7.42	102.68	110.10	14	20
1	A	33	TRP	NE1-CE2-CD2	-7.29	100.01	107.30	19	20
1	A	33	TRP	CG-CD2-CE3	-7.13	127.48	133.90	19	10
1	A	23	TRP	CG-CD1-NE1	-7.10	103.00	110.10	8	20
1	A	25	TYR	CB-CG-CD2	-7.08	116.75	121.00	16	14
1	A	49	GLN	CA-CB-CG	-6.05	100.09	113.40	18	9
1	A	25	TYR	CB-CG-CD1	5.91	124.55	121.00	16	8
1	A	45	TRP	NE1-CE2-CD2	-5.84	101.46	107.30	12	20
1	A	23	TRP	NE1-CE2-CD2	-5.53	101.77	107.30	10	16
1	A	33	TRP	CD1-CG-CD2	5.35	110.58	106.30	18	2
1	A	23	TRP	CA-CB-CG	-5.17	103.88	113.70	20	1

There are no chirality outliers.

All unique planar outliers are listed below.

Mol	Chain	Res	Type	Group	Models (Total)
1	A	40	GLY	Peptide	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	277	249	249	13±3
All	All	5540	4980	4980	261

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 25.

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

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:35:ASN:N	1:A:47:CYS:SG	0.78	2.57	19	7
1:A:35:ASN:HA	1:A:47:CYS:SG	0.76	2.21	3	19
1:A:29:CYS:SG	1:A:33:TRP:HB3	0.74	2.23	7	19
1:A:29:CYS:SG	1:A:33:TRP:CB	0.70	2.80	17	17
1:A:41:PRO:HD2	1:A:46:CYS:SG	0.69	2.27	14	5

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:41:PRO:CD	1:A:46:CYS:SG	0.66	2.84	14	5
1:A:41:PRO:HD3	1:A:46:CYS:SG	0.66	2.30	4	10
1:A:35:ASN:CA	1:A:47:CYS:SG	0.63	2.85	1	11
1:A:34:HIS:C	1:A:47:CYS:SG	0.62	2.77	20	11
1:A:36:CYS:SG	1:A:37:LYS:N	0.59	2.76	14	4
1:A:4:CYS:SG	1:A:5:LEU:N	0.58	2.76	5	3
1:A:36:CYS:SG	1:A:48:LYS:HB3	0.57	2.38	20	4
1:A:28:GLY:CA	1:A:45:TRP:CG	0.57	2.88	12	15
1:A:4:CYS:SG	1:A:22:LEU:HB2	0.56	2.40	7	2
1:A:37:LYS:HG3	1:A:46:CYS:CB	0.56	2.30	10	1
1:A:7:ASP:CG	1:A:37:LYS:HZ1	0.54	2.05	4	2
1:A:6:CYS:SG	1:A:48:LYS:CD	0.54	2.95	5	1
1:A:28:GLY:HA3	1:A:45:TRP:CG	0.53	2.38	12	13
1:A:7:ASP:CG	1:A:37:LYS:HZ2	0.53	2.07	2	4
1:A:36:CYS:SG	1:A:37:LYS:HG2	0.52	2.45	14	1
1:A:36:CYS:SG	1:A:48:LYS:HG2	0.52	2.44	15	3
1:A:36:CYS:SG	1:A:48:LYS:HB2	0.51	2.46	17	2
1:A:23:TRP:CE2	1:A:30:PRO:HG3	0.51	2.40	11	1
1:A:37:LYS:CE	1:A:37:LYS:HA	0.51	2.35	18	1
1:A:7:ASP:CG	1:A:37:LYS:NZ	0.51	2.64	4	1
1:A:6:CYS:SG	1:A:20:GLY:HA3	0.51	2.46	18	4
1:A:29:CYS:SG	1:A:34:HIS:O	0.50	2.70	11	5
1:A:30:PRO:HG2	1:A:33:TRP:CD1	0.50	2.42	11	16
1:A:7:ASP:OD1	1:A:37:LYS:NZ	0.50	2.45	3	5
1:A:29:CYS:SG	1:A:33:TRP:HB2	0.49	2.46	17	5
1:A:6:CYS:SG	1:A:48:LYS:HE3	0.49	2.48	16	1
1:A:33:TRP:HA	1:A:49:GLN:HA	0.49	1.84	16	8
1:A:3:SER:HA	1:A:21:THR:HA	0.48	1.85	20	1
1:A:6:CYS:SG	1:A:48:LYS:CE	0.48	3.01	5	1
1:A:29:CYS:SG	1:A:34:HIS:N	0.48	2.86	17	2
1:A:6:CYS:C	1:A:37:LYS:HD3	0.48	2.29	15	1
1:A:37:LYS:CG	1:A:46:CYS:HB3	0.48	2.38	10	2
1:A:35:ASN:O	1:A:48:LYS:NZ	0.48	2.40	1	1
1:A:34:HIS:O	1:A:47:CYS:SG	0.48	2.72	10	5
1:A:27:SER:O	1:A:29:CYS:N	0.47	2.48	11	1
1:A:48:LYS:HD3	1:A:48:LYS:C	0.47	2.30	7	2
1:A:37:LYS:C	1:A:39:HIS:H	0.47	2.13	14	1
1:A:48:LYS:CE	1:A:49:GLN:C	0.47	2.82	20	1
1:A:19:SER:O	1:A:48:LYS:NZ	0.46	2.49	10	1
1:A:37:LYS:HA	1:A:37:LYS:HE2	0.46	1.87	10	1
1:A:6:CYS:SG	1:A:48:LYS:HD3	0.46	2.50	5	1

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:6:CYS:SG	1:A:48:LYS:NZ	0.46	2.84	6	1
1:A:23:TRP:CG	1:A:30:PRO:HD3	0.46	2.46	16	1
1:A:37:LYS:HG3	1:A:46:CYS:HB3	0.45	1.89	10	1
1:A:47:CYS:SG	1:A:48:LYS:N	0.45	2.87	6	2
1:A:28:GLY:CA	1:A:45:TRP:HB2	0.44	2.42	5	2
1:A:34:HIS:CD2	1:A:35:ASN:ND2	0.44	2.85	1	1
1:A:22:LEU:HA	1:A:45:TRP:O	0.44	2.13	16	2
1:A:28:GLY:N	1:A:45:TRP:CD1	0.43	2.86	19	3
1:A:33:TRP:CE2	1:A:49:GLN:HG3	0.43	2.48	6	3
1:A:48:LYS:NZ	1:A:49:GLN:O	0.43	2.51	7	1
1:A:6:CYS:SG	1:A:48:LYS:HE2	0.43	2.54	5	1
1:A:38:ALA:O	1:A:39:HIS:ND1	0.43	2.52	20	1
1:A:23:TRP:CD2	1:A:30:PRO:HG3	0.43	2.48	11	1
1:A:33:TRP:CE3	1:A:48:LYS:C	0.43	2.92	20	3
1:A:33:TRP:O	1:A:34:HIS:ND1	0.42	2.52	2	1
1:A:4:CYS:O	1:A:20:GLY:N	0.42	2.53	19	1
1:A:6:CYS:SG	1:A:20:GLY:CA	0.42	3.08	18	1
1:A:45:TRP:CD1	1:A:45:TRP:N	0.42	2.87	12	2
1:A:28:GLY:HA3	1:A:45:TRP:CB	0.42	2.44	4	2
1:A:41:PRO:O	1:A:43:ILE:N	0.41	2.54	12	1
1:A:6:CYS:C	1:A:37:LYS:CD	0.41	2.88	15	1
1:A:28:GLY:HA3	1:A:45:TRP:HB2	0.40	1.94	4	1
1:A:28:GLY:HA3	1:A:45:TRP:CD2	0.40	2.51	12	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	36/49 (73%)	28±2 (77±5%)	7±2 (20±5%)	1±1 (3±2%)	7	41
All	All	720/980 (73%)	554 (77%)	145 (20%)	21 (3%)	7	41

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	35	ASN	5
1	A	31	SER	4
1	A	38	ALA	4
1	A	7	ASP	3
1	A	42	THR	2
1	A	28	GLY	1
1	A	29	CYS	1
1	A	32	GLY	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	31/40 (78%)	27±1 (87±4%)	4±1 (13±4%)	8 49
All	All	620/800 (78%)	541 (87%)	79 (13%)	8 49

All 15 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	29	CYS	18
1	A	22	LEU	11
1	A	35	ASN	10
1	A	36	CYS	10
1	A	48	LYS	6
1	A	7	ASP	4
1	A	2	VAL	3
1	A	5	LEU	3
1	A	37	LYS	3
1	A	4	CYS	3
1	A	42	THR	3
1	A	19	SER	2
1	A	3	SER	1
1	A	43	ILE	1
1	A	41	PRO	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)

No chemical shift data were provided