Full wwPDB NMR Structure Validation Report (i)

May 29, 2020 – 10:31 am BST

PDB ID	:	6MG9
Title	:	Human Obscurin Ig57 Domain
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Deposited on	:	2018-09-13

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 following versions of software and data (see references (1)) were used in the production of this report:

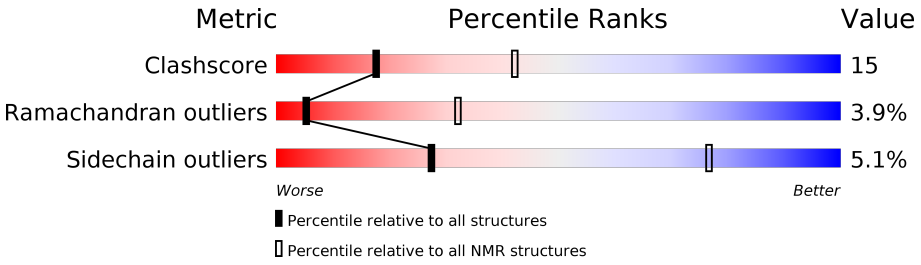
Cyrange	:	Kirchner and Güntert (2011)
NmrClust	:	Kelley et al. (1996)
MolProbity	:	4.02b-467
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
RCI	:	v_1n_11_5_13_A (Berjanski et al., 2005)
PANAV	:	Wang et al. (2010)
ShiftChecker	:	2.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

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 is 68%.

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	102	62% 25% 5% 8%

2 Ensemble composition and analysis

This entry contains 20 models. Model 1 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:4-A:92 (89)	0.52	1

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. No single-model clusters were found.

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

3 Entry composition

There is only 1 type of molecule in this entry. The entry contains 1392 atoms, of which 691 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called Obscurin.

Mol	Chain	Residues	Atoms						Trace
			Total	C	H	N	O	S	
1	A	94	1392	432	691	122	143	4	0

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MET	-	initiating methionine	UNP Q5VST9
A	94	GLY	-	expression tag	UNP Q5VST9
A	95	LEU	-	expression tag	UNP Q5VST9
A	96	GLU	-	expression tag	UNP Q5VST9
A	97	HIS	-	expression tag	UNP Q5VST9
A	98	HIS	-	expression tag	UNP Q5VST9
A	99	HIS	-	expression tag	UNP Q5VST9
A	100	HIS	-	expression tag	UNP Q5VST9
A	101	HIS	-	expression tag	UNP Q5VST9
A	102	HIS	-	expression tag	UNP Q5VST9

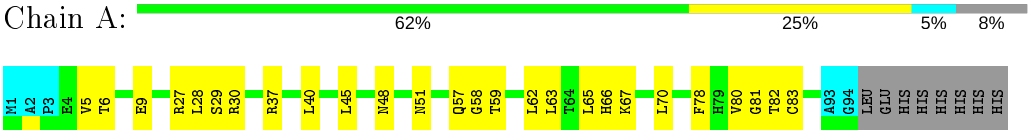
4 Residue-property plots

4.1 Average score per residue in the NMR ensemble

These plots are provided for all protein, RNA and DNA 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: Obscurin

Chain A:



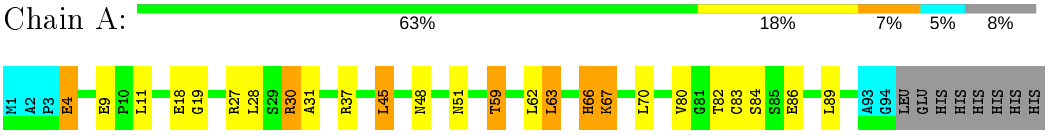
4.2 Scores per residue for each member of the ensemble

Colouring as in section 4.1 above.

4.2.1 Score per residue for model 1 (medoid)

- Molecule 1: Obscurin

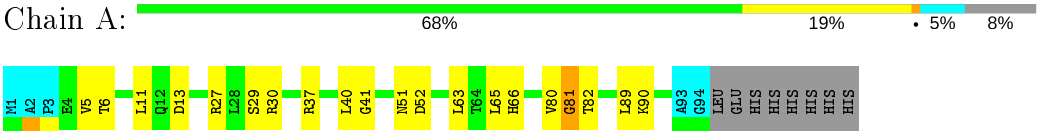
Chain A:



4.2.2 Score per residue for model 2

- Molecule 1: Obscurin

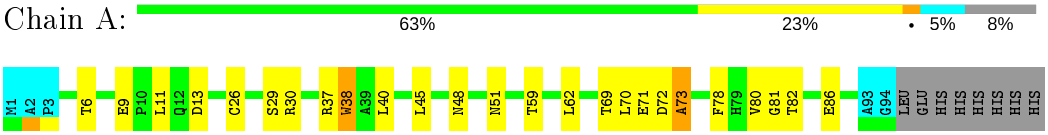
Chain A:



4.2.3 Score per residue for model 3

• Molecule 1: Obscurin

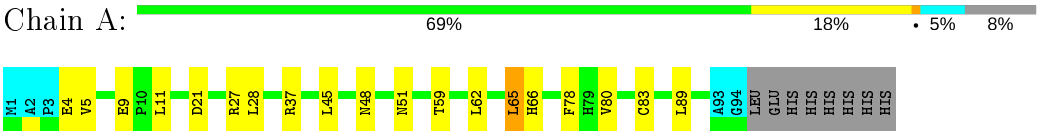
Chain A:



4.2.4 Score per residue for model 4

• Molecule 1: Obscurin

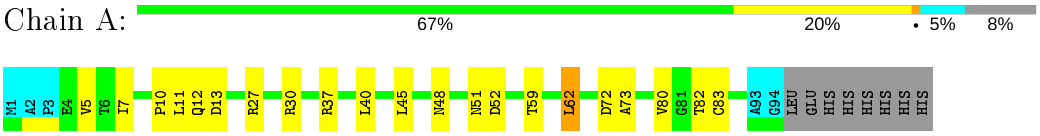
Chain A:



4.2.5 Score per residue for model 5

• Molecule 1: Obscurin

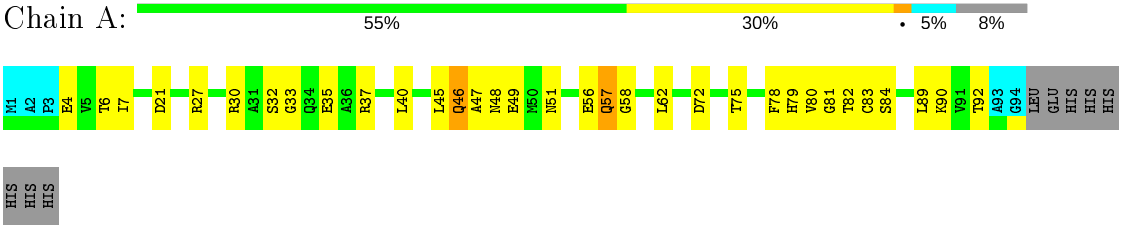
Chain A:



4.2.6 Score per residue for model 6

• Molecule 1: Obscurin

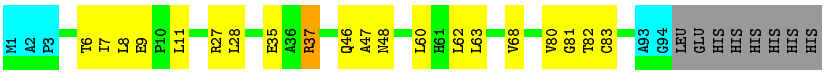
Chain A:



4.2.7 Score per residue for model 7

• Molecule 1: Obscurin

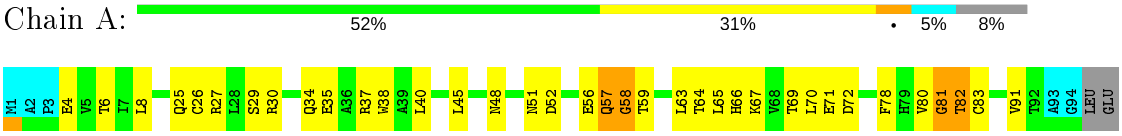
Chain A:



4.2.8 Score per residue for model 8

- Molecule 1: Obscurin

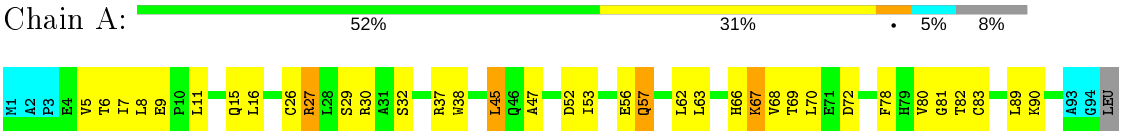
Chain A:



4.2.9 Score per residue for model 9

- Molecule 1: Obscurin

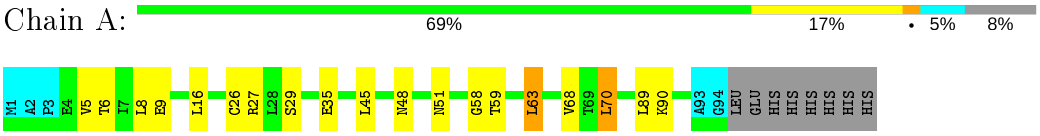
Chain A:



4.2.10 Score per residue for model 10

- Molecule 1: Obscurin

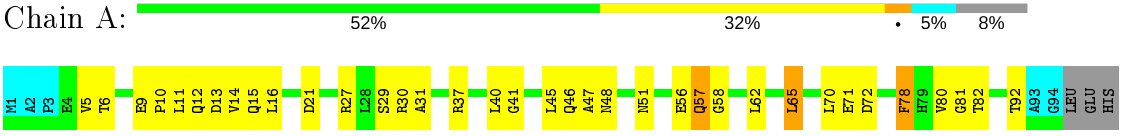
Chain A:



4.2.11 Score per residue for model 11

- Molecule 1: Obscurin

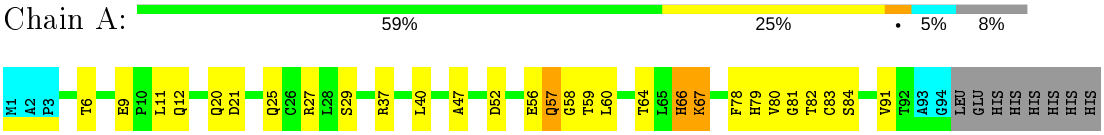
Chain A:



4.2.12 Score per residue for model 12

- Molecule 1: Obscurin

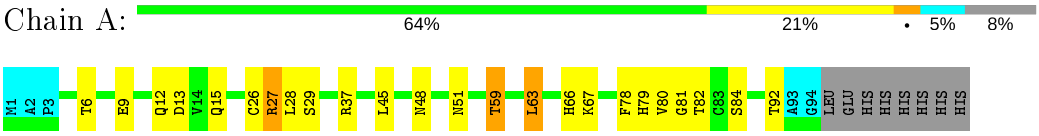
Chain A:



4.2.13 Score per residue for model 13

- Molecule 1: Obscurin

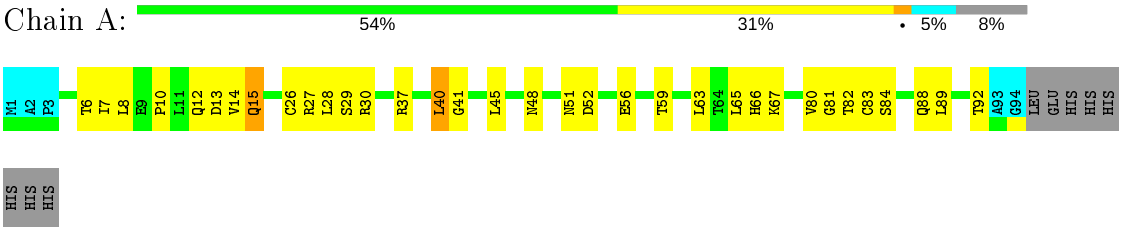
Chain A:



4.2.14 Score per residue for model 14

- Molecule 1: Obscurin

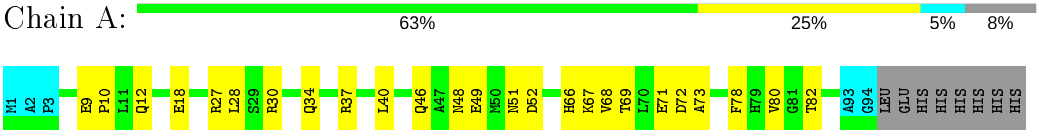
Chain A:



4.2.15 Score per residue for model 15

- Molecule 1: Obscurin

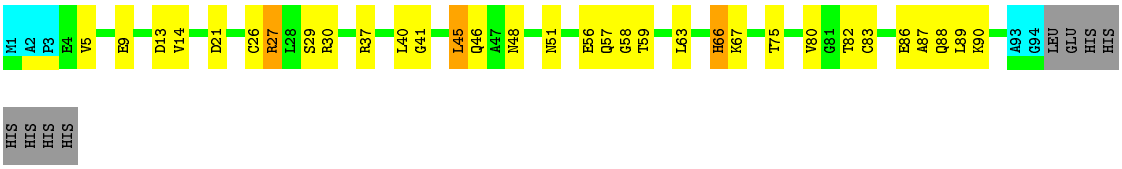
Chain A:



4.2.16 Score per residue for model 16

- Molecule 1: Obscurin

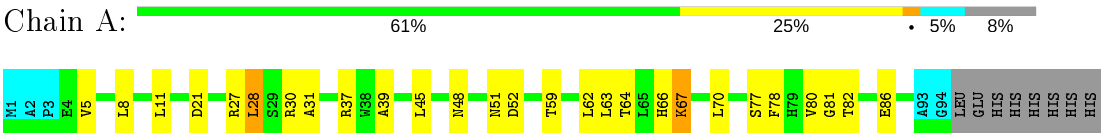
Chain A:



4.2.17 Score per residue for model 17

- Molecule 1: Obscurin

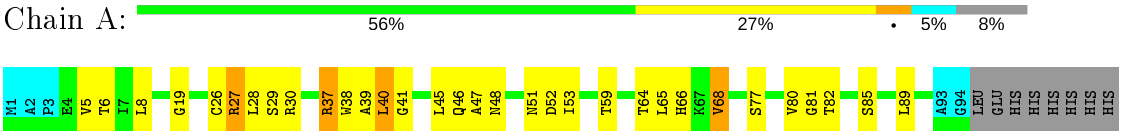
Chain A:



4.2.18 Score per residue for model 18

- Molecule 1: Obscurin

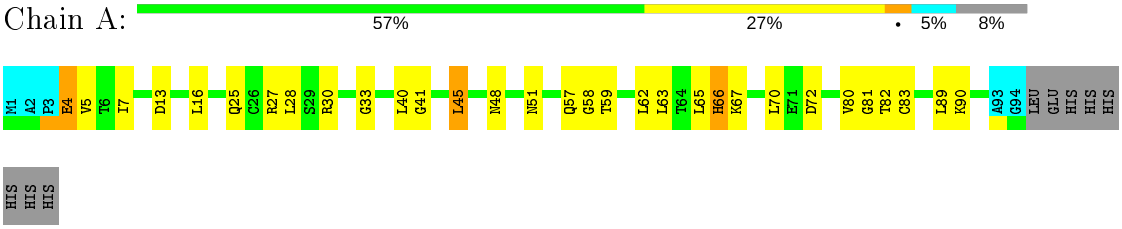
Chain A:



4.2.19 Score per residue for model 19

- Molecule 1: Obscurin

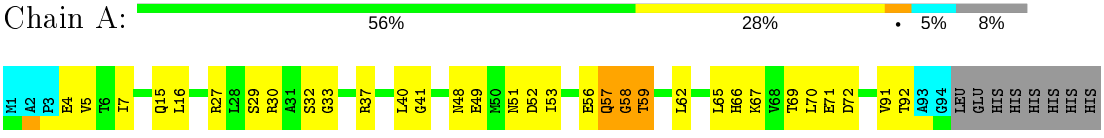
Chain A:



4.2.20 Score per residue for model 20

- Molecule 1: Obscurin

Chain A:



5 Refinement protocol and experimental data overview

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

Of the 200 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
X-PLOR NIH	structure calculation	

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)	input_cs.cif
Number of chemical shift lists	1
Total number of shifts	837
Number of shifts mapped to atoms	837
Number of unparsed shifts	0
Number of shifts with mapping errors	0
Number of shifts with mapping warnings	0
Assignment completeness (well-defined parts)	68%

No validations of the models with respect to experimental NMR restraints is performed at this time.

6 Model quality

6.1 Standard geometry

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	2.5±0.7
All	All	0	50

There are no bond-length outliers.

There are no bond-angle outliers.

There are no chirality outliers.

All 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	37	ARG	Sidechain	18
1	A	27	ARG	Sidechain	17
1	A	30	ARG	Sidechain	15

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	672	660	660	20±6
All	All	13440	13200	13200	400

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 15.

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

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:45:LEU:HD23	1:A:45:LEU:N	0.73	1.99	14	1
1:A:7:ILE:N	1:A:7:ILE:HD12	0.72	1.99	7	2
1:A:45:LEU:HD23	1:A:45:LEU:H	0.69	1.48	14	1
1:A:7:ILE:HD12	1:A:7:ILE:N	0.68	2.04	9	1
1:A:66:HIS:NE2	1:A:67:LYS:NZ	0.66	2.44	17	1
1:A:6:THR:C	1:A:7:ILE:HD12	0.64	2.13	6	2
1:A:5:VAL:HG23	1:A:29:SER:O	0.64	1.93	16	2
1:A:65:LEU:HD23	1:A:65:LEU:C	0.64	2.13	19	2
1:A:26:CYS:SG	1:A:27:ARG:N	0.61	2.74	18	4
1:A:7:ILE:O	1:A:7:ILE:HG23	0.60	1.95	19	2
1:A:83:CYS:SG	1:A:84:SER:N	0.59	2.75	1	4
1:A:40:LEU:C	1:A:40:LEU:HD23	0.57	2.19	5	6
1:A:39:ALA:HB3	1:A:77:SER:O	0.57	1.99	17	2
1:A:38:TRP:CZ2	1:A:78:PHE:CE1	0.57	2.93	3	1
1:A:7:ILE:HG23	1:A:7:ILE:O	0.57	1.99	5	2
1:A:46:GLN:O	1:A:48:ASN:N	0.56	2.38	16	6
1:A:11:LEU:N	1:A:11:LEU:HD12	0.56	2.16	11	1
1:A:80:VAL:O	1:A:82:THR:N	0.56	2.39	7	14
1:A:35:GLU:CD	1:A:35:GLU:H	0.56	2.04	8	1
1:A:70:LEU:O	1:A:70:LEU:HD13	0.55	2.01	10	1
1:A:62:LEU:C	1:A:62:LEU:HD23	0.55	2.21	9	3
1:A:6:THR:OG1	1:A:29:SER:N	0.55	2.40	8	3
1:A:13:ASP:OD1	1:A:14:VAL:N	0.55	2.40	14	2
1:A:66:HIS:ND1	1:A:67:LYS:N	0.54	2.55	1	4
1:A:6:THR:N	1:A:29:SER:OG	0.54	2.41	12	6
1:A:40:LEU:C	1:A:40:LEU:HD13	0.54	2.22	16	2
1:A:62:LEU:HD23	1:A:62:LEU:C	0.54	2.22	1	2
1:A:6:THR:HG23	1:A:29:SER:OG	0.54	2.02	9	2
1:A:9:GLU:OE1	1:A:78:PHE:CZ	0.54	2.61	13	1
1:A:9:GLU:OE1	1:A:9:GLU:N	0.54	2.41	16	1
1:A:64:THR:CG2	1:A:66:HIS:NE2	0.54	2.71	18	1
1:A:15:GLN:C	1:A:16:LEU:HD22	0.53	2.23	11	3
1:A:38:TRP:CZ2	1:A:78:PHE:CE2	0.53	2.96	8	1
1:A:10:PRO:O	1:A:12:GLN:N	0.53	2.41	15	4
1:A:48:ASN:OD1	1:A:49:GLU:N	0.52	2.42	20	3
1:A:89:LEU:HD23	1:A:89:LEU:C	0.52	2.24	19	6
1:A:79:HIS:ND1	1:A:84:SER:OG	0.52	2.40	6	2
1:A:62:LEU:HD13	1:A:63:LEU:N	0.52	2.18	19	2
1:A:7:ILE:N	1:A:7:ILE:CD1	0.52	2.72	9	2
1:A:66:HIS:CG	1:A:67:LYS:N	0.52	2.78	15	3
1:A:35:GLU:OE1	1:A:35:GLU:N	0.52	2.42	10	1
1:A:52:ASP:OD1	1:A:53:ILE:N	0.52	2.43	18	1

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:82:THR:OG1	1:A:83:CYS:N	0.52	2.42	12	4
1:A:58:GLY:O	1:A:59:THR:HG23	0.52	2.05	8	2
1:A:45:LEU:CD2	1:A:45:LEU:N	0.52	2.71	14	1
1:A:40:LEU:HD23	1:A:41:GLY:N	0.51	2.21	11	4
1:A:51:ASN:OD1	1:A:51:ASN:N	0.51	2.40	20	1
1:A:48:ASN:O	1:A:51:ASN:O	0.51	2.27	20	15
1:A:66:HIS:CG	1:A:67:LYS:H	0.51	2.23	12	4
1:A:9:GLU:OE2	1:A:78:PHE:CE2	0.51	2.63	12	2
1:A:4:GLU:CD	1:A:4:GLU:H	0.51	2.08	1	1
1:A:86:GLU:OE2	1:A:86:GLU:N	0.51	2.43	3	2
1:A:70:LEU:O	1:A:72:ASP:N	0.51	2.43	11	2
1:A:89:LEU:C	1:A:89:LEU:HD23	0.51	2.26	1	3
1:A:13:ASP:CG	1:A:15:GLN:HE21	0.51	2.09	11	1
1:A:9:GLU:OE1	1:A:78:PHE:CE2	0.51	2.64	15	1
1:A:40:LEU:N	1:A:45:LEU:HD11	0.50	2.20	6	1
1:A:89:LEU:N	1:A:89:LEU:HD12	0.50	2.21	4	1
1:A:35:GLU:H	1:A:35:GLU:CD	0.50	2.10	6	1
1:A:45:LEU:N	1:A:45:LEU:HD12	0.50	2.21	6	1
1:A:46:GLN:N	1:A:46:GLN:CD	0.50	2.65	7	2
1:A:9:GLU:OE1	1:A:26:CYS:SG	0.50	2.70	9	2
1:A:7:ILE:CG2	1:A:7:ILE:O	0.50	2.60	14	2
1:A:70:LEU:C	1:A:72:ASP:H	0.49	2.11	20	5
1:A:65:LEU:HD13	1:A:66:HIS:N	0.49	2.22	4	1
1:A:52:ASP:OD2	1:A:53:ILE:N	0.49	2.44	20	2
1:A:19:GLY:H	1:A:68:VAL:CG1	0.49	2.20	18	1
1:A:45:LEU:HD12	1:A:45:LEU:O	0.49	2.07	9	1
1:A:40:LEU:HD23	1:A:40:LEU:C	0.49	2.27	8	2
1:A:25:GLN:OE1	1:A:62:LEU:CD2	0.48	2.61	19	1
1:A:89:LEU:HD23	1:A:90:LYS:N	0.48	2.23	10	6
1:A:88:GLN:CD	1:A:88:GLN:N	0.48	2.66	16	1
1:A:62:LEU:HD13	1:A:62:LEU:C	0.48	2.28	19	2
1:A:52:ASP:OD1	1:A:64:THR:O	0.48	2.31	8	1
1:A:4:GLU:OE2	1:A:5:VAL:N	0.48	2.46	20	1
1:A:80:VAL:O	1:A:81:GLY:C	0.48	2.52	8	3
1:A:28:LEU:O	1:A:59:THR:CG2	0.48	2.61	19	3
1:A:51:ASN:OD1	1:A:63:LEU:CD1	0.48	2.61	10	1
1:A:70:LEU:C	1:A:72:ASP:N	0.47	2.67	11	5
1:A:8:LEU:O	1:A:26:CYS:SG	0.47	2.70	18	1
1:A:5:VAL:O	1:A:5:VAL:HG13	0.47	2.08	5	3
1:A:6:THR:OG1	1:A:29:SER:CB	0.47	2.62	3	4
1:A:60:LEU:CD2	1:A:60:LEU:N	0.47	2.77	12	1

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:63:LEU:CD2	1:A:63:LEU:N	0.47	2.77	8	1
1:A:4:GLU:O	1:A:29:SER:OG	0.47	2.32	8	1
1:A:16:LEU:O	1:A:91:VAL:HG23	0.47	2.10	20	1
1:A:38:TRP:CE2	1:A:78:PHE:CE2	0.47	3.03	8	1
1:A:86:GLU:CD	1:A:86:GLU:N	0.47	2.68	17	1
1:A:66:HIS:O	1:A:68:VAL:N	0.47	2.47	9	1
1:A:60:LEU:HD12	1:A:60:LEU:N	0.47	2.25	7	1
1:A:30:ARG:NH1	1:A:31:ALA:O	0.46	2.49	1	1
1:A:51:ASN:OD1	1:A:52:ASP:N	0.46	2.47	2	1
1:A:51:ASN:O	1:A:52:ASP:OD2	0.46	2.33	17	2
1:A:28:LEU:O	1:A:59:THR:OG1	0.46	2.32	4	3
1:A:5:VAL:HG22	1:A:31:ALA:HA	0.46	1.87	11	2
1:A:40:LEU:HD13	1:A:41:GLY:N	0.46	2.25	14	3
1:A:6:THR:CB	1:A:29:SER:OG	0.46	2.63	18	1
1:A:80:VAL:C	1:A:82:THR:N	0.46	2.69	11	11
1:A:32:SER:OG	1:A:33:GLY:N	0.46	2.48	6	2
1:A:6:THR:OG1	1:A:29:SER:OG	0.46	2.31	11	4
1:A:35:GLU:O	1:A:37:ARG:NH1	0.46	2.48	7	1
1:A:6:THR:HG22	1:A:8:LEU:CD1	0.46	2.41	7	1
1:A:89:LEU:N	1:A:89:LEU:CD1	0.46	2.79	4	1
1:A:40:LEU:N	1:A:45:LEU:HD21	0.46	2.26	11	1
1:A:63:LEU:N	1:A:63:LEU:CD1	0.46	2.77	14	2
1:A:80:VAL:C	1:A:82:THR:H	0.46	2.14	16	3
1:A:28:LEU:HD23	1:A:28:LEU:C	0.46	2.31	15	2
1:A:6:THR:HG1	1:A:29:SER:CB	0.46	2.24	9	1
1:A:40:LEU:HD23	1:A:40:LEU:H	0.46	1.70	15	1
1:A:37:ARG:NH2	1:A:38:TRP:O	0.46	2.49	18	1
1:A:69:THR:O	1:A:71:GLU:N	0.46	2.49	3	2
1:A:8:LEU:CD2	1:A:27:ARG:NH1	0.46	2.79	9	1
1:A:48:ASN:O	1:A:51:ASN:N	0.46	2.49	20	1
1:A:69:THR:C	1:A:71:GLU:N	0.45	2.69	15	2
1:A:56:GLU:O	1:A:57:GLN:O	0.45	2.33	20	7
1:A:34:GLN:CD	1:A:34:GLN:N	0.45	2.69	15	1
1:A:62:LEU:CD2	1:A:64:THR:OG1	0.45	2.64	17	1
1:A:5:VAL:O	1:A:5:VAL:CG1	0.45	2.64	5	1
1:A:45:LEU:CD2	1:A:45:LEU:H	0.45	2.23	19	1
1:A:80:VAL:O	1:A:83:CYS:O	0.45	2.34	4	4
1:A:65:LEU:N	1:A:65:LEU:HD12	0.45	2.26	8	1
1:A:57:GLN:O	1:A:59:THR:N	0.45	2.49	8	2
1:A:65:LEU:HD23	1:A:66:HIS:N	0.45	2.26	18	3
1:A:56:GLU:O	1:A:57:GLN:C	0.45	2.55	6	6

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:59:THR:OG1	1:A:59:THR:O	0.45	2.35	12	1
1:A:69:THR:OG1	1:A:70:LEU:N	0.45	2.47	9	1
1:A:11:LEU:CD1	1:A:11:LEU:N	0.45	2.80	11	1
1:A:4:GLU:CD	1:A:4:GLU:N	0.44	2.70	4	1
1:A:12:GLN:O	1:A:13:ASP:OD2	0.44	2.35	5	1
1:A:70:LEU:O	1:A:72:ASP:OD2	0.44	2.35	8	1
1:A:13:ASP:OD1	1:A:88:GLN:O	0.44	2.34	14	1
1:A:21:ASP:O	1:A:21:ASP:OD1	0.44	2.35	17	2
1:A:7:ILE:C	1:A:8:LEU:HD12	0.44	2.33	14	1
1:A:9:GLU:O	1:A:9:GLU:CG	0.44	2.66	7	1
1:A:65:LEU:C	1:A:65:LEU:HD23	0.44	2.33	2	1
1:A:70:LEU:CD2	1:A:70:LEU:N	0.44	2.81	17	1
1:A:72:ASP:O	1:A:73:ALA:O	0.44	2.35	15	2
1:A:51:ASN:ND2	1:A:63:LEU:HD11	0.44	2.28	1	1
1:A:66:HIS:O	1:A:67:LYS:C	0.44	2.56	9	1
1:A:8:LEU:O	1:A:27:ARG:O	0.43	2.35	10	1
1:A:56:GLU:N	1:A:56:GLU:OE2	0.43	2.50	14	1
1:A:21:ASP:N	1:A:21:ASP:OD1	0.43	2.50	4	1
1:A:79:HIS:N	1:A:79:HIS:CD2	0.43	2.86	12	1
1:A:66:HIS:O	1:A:68:VAL:HG13	0.43	2.14	9	1
1:A:78:PHE:CD2	1:A:78:PHE:N	0.43	2.84	12	1
1:A:13:ASP:OD2	1:A:13:ASP:O	0.43	2.37	13	2
1:A:48:ASN:OD1	1:A:51:ASN:O	0.43	2.36	8	1
1:A:65:LEU:N	1:A:65:LEU:CD2	0.43	2.81	20	2
1:A:69:THR:O	1:A:72:ASP:OD1	0.43	2.36	20	1
1:A:86:GLU:N	1:A:86:GLU:CD	0.43	2.71	1	1
1:A:72:ASP:O	1:A:73:ALA:C	0.43	2.57	3	2
1:A:48:ASN:O	1:A:52:ASP:OD1	0.43	2.37	5	2
1:A:40:LEU:HD13	1:A:40:LEU:C	0.43	2.34	18	1
1:A:65:LEU:N	1:A:65:LEU:HD23	0.43	2.29	11	1
1:A:18:GLU:CD	1:A:19:GLY:N	0.43	2.72	1	1
1:A:72:ASP:OD1	1:A:72:ASP:N	0.43	2.49	6	1
1:A:58:GLY:C	1:A:59:THR:OG1	0.43	2.57	20	1
1:A:28:LEU:O	1:A:59:THR:CB	0.43	2.67	4	1
1:A:58:GLY:O	1:A:59:THR:CG2	0.43	2.67	8	1
1:A:69:THR:C	1:A:71:GLU:H	0.43	2.17	15	1
1:A:66:HIS:O	1:A:67:LYS:O	0.43	2.36	16	1
1:A:57:GLN:CD	1:A:58:GLY:N	0.43	2.73	19	1
1:A:66:HIS:C	1:A:66:HIS:HD1	0.43	2.17	19	1
1:A:62:LEU:CD1	1:A:62:LEU:C	0.42	2.88	7	2
1:A:52:ASP:OD1	1:A:52:ASP:N	0.42	2.51	8	1

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:13:ASP:OD2	1:A:14:VAL:N	0.42	2.52	11	1
1:A:28:LEU:O	1:A:59:THR:HG21	0.42	2.15	14	1
1:A:65:LEU:CD2	1:A:65:LEU:C	0.42	2.84	19	1
1:A:63:LEU:HD12	1:A:63:LEU:N	0.42	2.29	14	1
1:A:89:LEU:C	1:A:89:LEU:CD2	0.42	2.88	2	2
1:A:9:GLU:OE2	1:A:78:PHE:CE1	0.42	2.73	4	1
1:A:51:ASN:O	1:A:52:ASP:OD1	0.42	2.38	14	2
1:A:25:GLN:C	1:A:26:CYS:SG	0.42	2.98	8	1
1:A:15:GLN:N	1:A:15:GLN:CD	0.42	2.73	14	2
1:A:40:LEU:C	1:A:40:LEU:CD1	0.42	2.87	16	2
1:A:45:LEU:H	1:A:45:LEU:CD2	0.42	2.28	1	1
1:A:18:GLU:OE2	1:A:68:VAL:O	0.42	2.37	15	1
1:A:70:LEU:N	1:A:70:LEU:HD22	0.42	2.29	17	1
1:A:9:GLU:C	1:A:11:LEU:H	0.42	2.16	3	2
1:A:89:LEU:CD2	1:A:89:LEU:C	0.42	2.88	16	2
1:A:48:ASN:O	1:A:52:ASP:OD2	0.42	2.38	15	1
1:A:45:LEU:HD12	1:A:45:LEU:C	0.42	2.35	16	1
1:A:62:LEU:CD2	1:A:62:LEU:C	0.42	2.88	1	2
1:A:40:LEU:C	1:A:40:LEU:CD2	0.42	2.88	5	1
1:A:13:ASP:N	1:A:13:ASP:OD2	0.42	2.50	3	2
1:A:20:GLN:HE21	1:A:21:ASP:C	0.42	2.18	12	1
1:A:52:ASP:O	1:A:64:THR:OG1	0.42	2.32	12	1
1:A:62:LEU:C	1:A:62:LEU:CD1	0.42	2.88	5	1
1:A:63:LEU:CD1	1:A:63:LEU:C	0.42	2.89	13	1
1:A:5:VAL:HG13	1:A:5:VAL:O	0.41	2.15	4	2
1:A:91:VAL:O	1:A:91:VAL:HG13	0.41	2.14	8	1
1:A:60:LEU:HD22	1:A:60:LEU:N	0.41	2.30	12	1
1:A:80:VAL:O	1:A:80:VAL:HG13	0.41	2.15	14	1
1:A:40:LEU:HD23	1:A:40:LEU:N	0.41	2.29	15	1
1:A:60:LEU:N	1:A:60:LEU:CD1	0.41	2.83	7	1
1:A:6:THR:HG22	1:A:8:LEU:HD13	0.41	1.91	7	1
1:A:62:LEU:C	1:A:62:LEU:HD13	0.41	2.36	5	1
1:A:62:LEU:HD23	1:A:63:LEU:N	0.41	2.30	1	1
1:A:38:TRP:CZ3	1:A:78:PHE:CD1	0.41	3.09	3	1
1:A:38:TRP:CZ3	1:A:78:PHE:CZ	0.41	3.08	9	1
1:A:13:ASP:OD2	1:A:90:LYS:NZ	0.41	2.53	16	1
1:A:21:ASP:OD2	1:A:21:ASP:C	0.41	2.59	16	1
1:A:40:LEU:CD1	1:A:40:LEU:C	0.41	2.89	18	1
1:A:58:GLY:O	1:A:59:THR:OG1	0.41	2.37	16	1
1:A:38:TRP:CB	1:A:45:LEU:HD11	0.41	2.46	9	1
1:A:20:GLN:CD	1:A:20:GLN:C	0.41	2.80	12	1

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:78:PHE:C	1:A:78:PHE:CD1	0.41	2.94	17	1
1:A:25:GLN:CD	1:A:25:GLN:N	0.41	2.74	12	1
1:A:75:THR:HG23	1:A:87:ALA:O	0.40	2.16	16	1
1:A:21:ASP:C	1:A:21:ASP:OD1	0.40	2.59	17	1
1:A:77:SER:OG	1:A:85:SER:O	0.40	2.39	18	1
1:A:91:VAL:HG23	1:A:91:VAL:O	0.40	2.17	12	1
1:A:38:TRP:CE2	1:A:78:PHE:CE1	0.40	3.09	3	1
1:A:65:LEU:C	1:A:65:LEU:CD1	0.40	2.89	4	1
1:A:66:HIS:C	1:A:66:HIS:ND1	0.40	2.74	19	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	89/102 (87%)	61±30 (68±34%)	8±4 (9±5%)	3±2 (3±3%)	7	39
All	All	1424/2040 (70%)	1212 (85%)	156 (11%)	56 (4%)	5	32

All 18 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	81	GLY	12
1	A	57	GLN	6
1	A	47	ALA	6
1	A	67	LYS	5
1	A	58	GLY	5
1	A	4	GLU	3
1	A	11	LEU	3
1	A	71	GLU	3
1	A	66	HIS	2
1	A	82	THR	2
1	A	12	GLN	2
1	A	73	ALA	1
1	A	68	VAL	1

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Mol	Chain	Res	Type	Models (Total)
1	A	32	SER	1
1	A	69	THR	1
1	A	70	LEU	1
1	A	33	GLY	1
1	A	59	THR	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	0	-	-	-
All	All	1200/1700 (71%)	1139 (95%)	61 (5%)	27 77

All 25 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	45	LEU	12
1	A	63	LEU	6
1	A	62	LEU	4
1	A	59	THR	4
1	A	11	LEU	4
1	A	78	PHE	2
1	A	5	VAL	2
1	A	15	GLN	2
1	A	16	LEU	2
1	A	65	LEU	2
1	A	8	LEU	2
1	A	70	LEU	2
1	A	68	VAL	2
1	A	40	LEU	2
1	A	66	HIS	2
1	A	92	THR	2
1	A	26	CYS	1
1	A	83	CYS	1
1	A	82	THR	1
1	A	46	GLN	1
1	A	38	TRP	1

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Mol	Chain	Res	Type	Models (Total)
1	A	34	GLN	1
1	A	28	LEU	1
1	A	75	THR	1
1	A	21	ASP	1

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 carbohydrates 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

There are no chain breaks in this entry.

7 Chemical shift validation

The completeness of assignment taking into account all chemical shift lists is 68% for the well-defined parts and 66% for the entire structure.

7.1 Chemical shift list 1

File name: input_cs.cif

Chemical shift list name: *Ig57-NMR-STAR.txt*

7.1.1 Bookkeeping

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	837
Number of shifts mapped to atoms	837
Number of unparsed shifts	0
Number of shifts with mapping errors	0
Number of shifts with mapping warnings	0
Number of shift outliers (ShiftChecker)	2

7.1.2 Chemical shift referencing

The following table shows the suggested chemical shift referencing corrections.

Nucleus	# values	Correction ± precision, *ppm*	Suggested action
$^{13}C_{\alpha}$	86	-0.14 ± 0.21	None needed (< 0.5 ppm)
$^{13}C_{\beta}$	78	-0.25 ± 0.20	None needed (< 0.5 ppm)
$^{13}C'$	77	0.19 ± 0.32	None needed (< 0.5 ppm)
^{15}N	0	—	None (insufficient data)

7.1.3 Completeness of resonance assignments

The following table shows the completeness of the chemical shift assignments for the well-defined regions of the structure. The overall completeness is 68%, i.e. 699 atoms were assigned a chemical shift out of a possible 1029. 0 out of 20 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	^{1}H	^{13}C	^{15}N
Backbone	326/441 (74%)	167/176 (95%)	159/178 (89%)	0/87 (0%)
Sidechain	373/537 (69%)	230/309 (74%)	143/207 (69%)	0/21 (0%)

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	Total	^{1}H	^{13}C	^{15}N
Aromatic	0/51 (0%)	0/28 (0%)	0/19 (0%)	0/4 (0%)
Overall	699/1029 (68%)	397/513 (77%)	302/404 (75%)	0/112 (0%)

The following table shows the completeness of the chemical shift assignments for the full structure. The overall completeness is 66%, i.e. 709 atoms were assigned a chemical shift out of a possible 1073. 0 out of 20 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	^{1}H	^{13}C	^{15}N
Backbone	334/464 (72%)	171/185 (92%)	163/188 (87%)	0/91 (0%)
Sidechain	375/558 (67%)	231/322 (72%)	144/215 (67%)	0/21 (0%)
Aromatic	0/51 (0%)	0/28 (0%)	0/19 (0%)	0/4 (0%)
Overall	709/1073 (66%)	402/535 (75%)	307/422 (73%)	0/116 (0%)

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	77	SER	HB2	5.37	5.18 – 2.58	5.7
1	A	77	SER	HB3	5.37	5.25 – 2.45	5.4

7.1.5 Random Coil Index (RCI) plots (i)

No *random coil index* (RCI) plot could be generated from the current chemical shift list (Ig57-NMR-STAR.txt). RCI is only applicable to proteins.