



Full wwPDB NMR Structure Validation Report ⓘ

Aug 1, 2016 – 10:51 AM EDT

PDB ID : 5I22
Title : Amphiphysin SH3 in complex with Chikungunya virus nsP3 peptide
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Deposited on : 2016-02-04

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

<http://wwpdb.org/validation/2016/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:

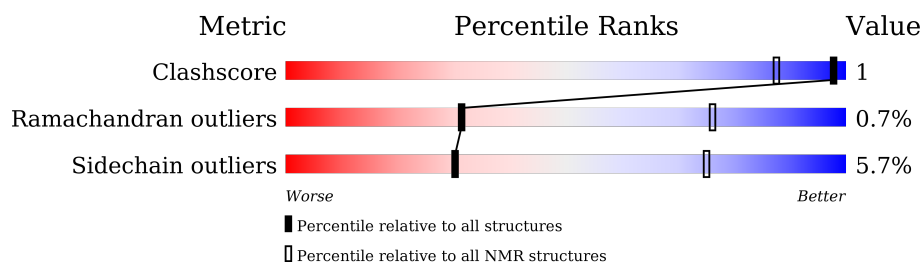
Cyrange	:	Kirchner and Güntert (2011)
NmrClust	:	Kelley et al. (1996)
MolProbity	:	4.02b-467
Mogul	:	unknown
Percentile statistics	:	20151230.v01 (using entries in the PDB archive December 30th 2015)
RCI	:	v_1n_11_5_13_A (Berjanski et al., 2005)
PANAV	:	Wang et al. (2010)
ShiftChecker	:	rb-20027939
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	rb-20027939

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 85%.

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	114402	11133
Ramachandran outliers	111179	9975
Sidechain outliers	111093	9958

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	81	 81% 6% 12%
2	B	17	 29% 71%

2 Ensemble composition and analysis

This entry contains 20 models. Model 16 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:517-A:552, A:558-A:592, B:1731-B:1735 (76)	0.20	16

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 8 single-model clusters were found.

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

3 Entry composition [i](#)

There are 2 unique types of molecules in this entry. The entry contains 1569 atoms, of which 774 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called Myc box-dependent-interacting protein 1.

Mol	Chain	Residues	Atoms						Trace
1	A	81	Total	C	H	N	O	S	0
			1283	417	624	110	129	3	

- Molecule 2 is a protein called CHIKV nsP3 peptide.

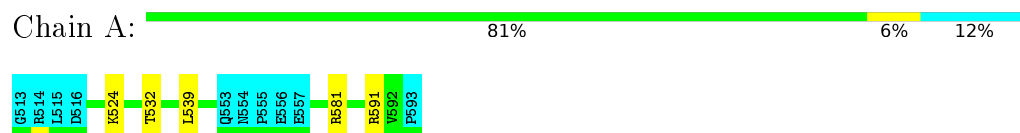
Mol	Chain	Residues	Atoms					Trace
2	B	17	Total	C	H	N	O	0
			286	81	150	33	22	

4 Residue-property plots [i](#)

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: Myc box-dependent-interacting protein 1



- Molecule 2: CHIKV nsP3 peptide

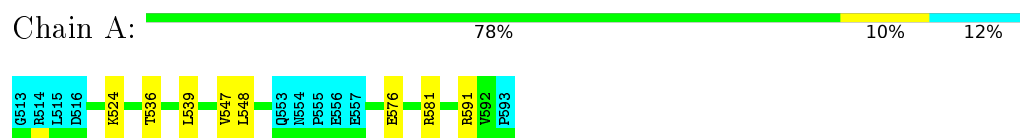


4.2 Scores per residue for each member of the ensemble

Colouring as in section 4.1 above.

4.2.1 Score per residue for model 1

- Molecule 1: Myc box-dependent-interacting protein 1

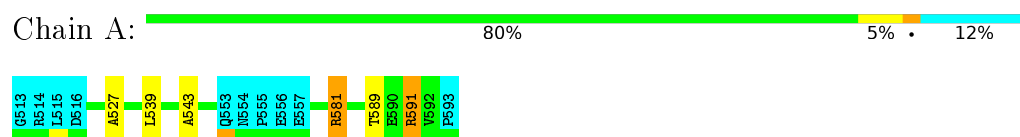


- Molecule 2: CHIKV nsP3 peptide



4.2.2 Score per residue for model 2

- Molecule 1: Myc box-dependent-interacting protein 1

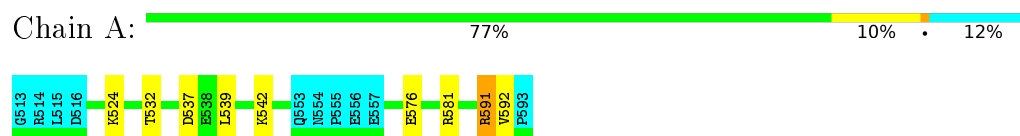


- Molecule 2: CHIKV nsP3 peptide



4.2.3 Score per residue for model 3

- Molecule 1: Myc box-dependent-interacting protein 1

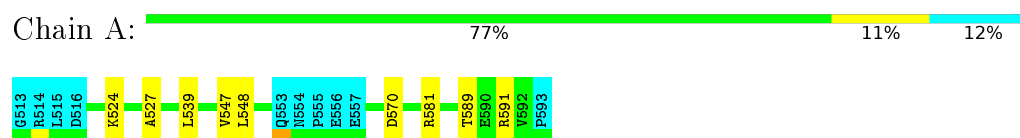


- Molecule 2: CHIKV nsP3 peptide



4.2.4 Score per residue for model 4

- Molecule 1: Myc box-dependent-interacting protein 1




- Molecule 2: CHIKV nsP3 peptide



4.2.5 Score per residue for model 5

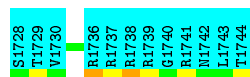
- Molecule 1: Myc box-dependent-interacting protein 1

Chain A:  78% 9% 12%




- Molecule 2: CHIKV nsP3 peptide

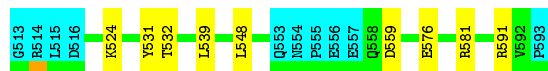
Chain B:  29% 71%



4.2.6 Score per residue for model 6

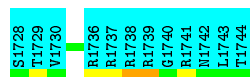
- Molecule 1: Myc box-dependent-interacting protein 1

Chain A:  77% 11% 12%




- Molecule 2: CHIKV nsP3 peptide

Chain B:  29% 71%



4.2.7 Score per residue for model 7

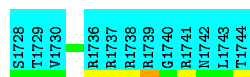
- Molecule 1: Myc box-dependent-interacting protein 1

Chain A:  80% 6% 12%




- Molecule 2: CHIKV nsP3 peptide

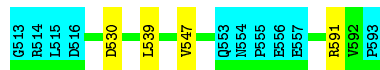
Chain B:  29% 71%



4.2.8 Score per residue for model 8

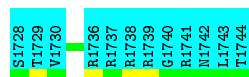
- Molecule 1: Myc box-dependent-interacting protein 1

Chain A:  83% 5% 12%




- Molecule 2: CHIKV nsP3 peptide

Chain B:  29% 71%



4.2.9 Score per residue for model 9

- Molecule 1: Myc box-dependent-interacting protein 1

Chain A:  78% 10% 12%




- Molecule 2: CHIKV nsP3 peptide

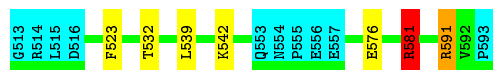
Chain B:  29% 71%



4.2.10 Score per residue for model 10

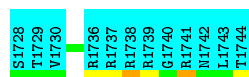
- Molecule 1: Myc box-dependent-interacting protein 1

Chain A:  79% 6% 12%



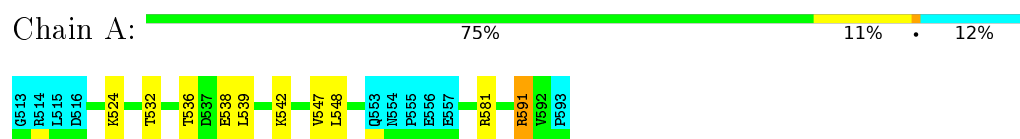
- Molecule 2: CHIKV nsP3 peptide

Chain B:  29% 71%



4.2.11 Score per residue for model 11

- Molecule 1: Myc box-dependent-interacting protein 1

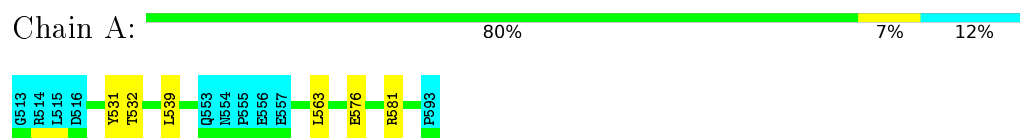


- Molecule 2: CHIKV nsP3 peptide



4.2.12 Score per residue for model 12

- Molecule 1: Myc box-dependent-interacting protein 1

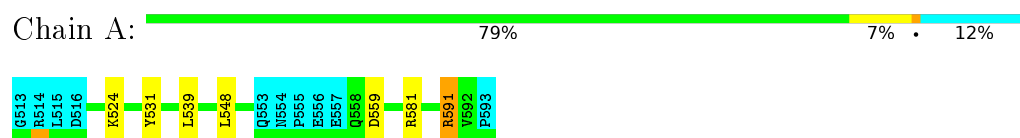


- Molecule 2: CHIKV nsP3 peptide



4.2.13 Score per residue for model 13

- Molecule 1: Myc box-dependent-interacting protein 1



- Molecule 2: CHIKV nsP3 peptide



4.2.14 Score per residue for model 14

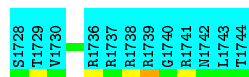
- Molecule 1: Myc box-dependent-interacting protein 1

Chain A: 79% 7% 12%



- Molecule 2: CHIKV nsP3 peptide

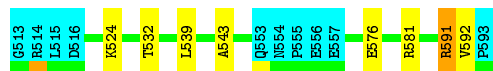
Chain B: 29% 71%



4.2.15 Score per residue for model 15

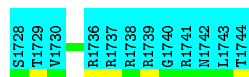
- Molecule 1: Myc box-dependent-interacting protein 1

Chain A: 78% 9% 12%



- Molecule 2: CHIKV nsP3 peptide

Chain B: 29% 71%



4.2.16 Score per residue for model 16 (medoid)

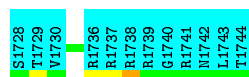
- Molecule 1: Myc box-dependent-interacting protein 1

Chain A: 79% 9% 12%



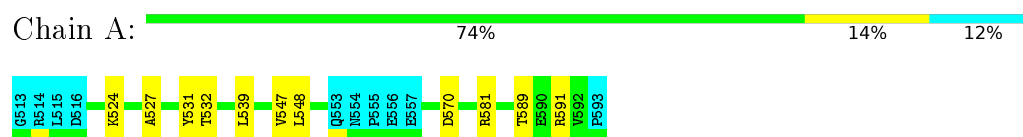
- Molecule 2: CHIKV nsP3 peptide

Chain B: 29% 71%



4.2.17 Score per residue for model 17

- Molecule 1: Myc box-dependent-interacting protein 1

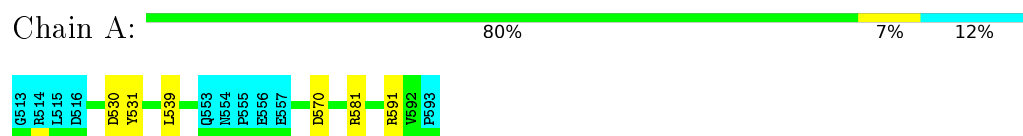


- Molecule 2: CHIKV nsP3 peptide



4.2.18 Score per residue for model 18

- Molecule 1: Myc box-dependent-interacting protein 1

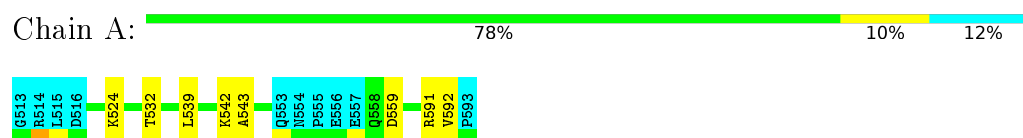


- Molecule 2: CHIKV nsP3 peptide



4.2.19 Score per residue for model 19

- Molecule 1: Myc box-dependent-interacting protein 1




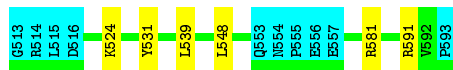
- Molecule 2: CHIKV nsP3 peptide



4.2.20 Score per residue for model 20

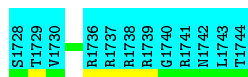
- Molecule 1: Myc box-dependent-interacting protein 1

Chain A:  80% 7% 12%



- Molecule 2: CHIKV nsP3 peptide

Chain B:  29% 71%



5 Refinement protocol and experimental data overview

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
AMBER	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)	5i22_cs.cif
Number of chemical shift lists	1
Total number of shifts	1143
Number of shifts mapped to atoms	1143
Number of unparsed shifts	0
Number of shifts with mapping errors	0
Number of shifts with mapping warnings	0
Assignment completeness (well-defined parts)	85%

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

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	0.68±0.01	0±0/594 (0.0±0.0%)	1.07±0.03	2±1/807 (0.2±0.1%)
2	B	0.60±0.02	0±0/36 (0.0±0.0%)	0.97±0.04	0±0/52 (0.0±0.0%)
All	All	0.68	0/12600 (0.0%)	1.07	36/17180 (0.2%)

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	0.6±0.5
All	All	0	11

There are no bond-length outliers.

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(°)	Ideal(°)	Models	
								Worst	Total
1	A	581	ARG	NE-CZ-NH1	10.14	125.37	120.30	13	17
1	A	591	ARG	NE-CZ-NH1	9.88	125.24	120.30	14	12
1	A	581	ARG	NE-CZ-NH2	-6.45	117.07	120.30	13	1
1	A	581	ARG	CD-NE-CZ	6.22	132.31	123.60	15	3
1	A	591	ARG	NE-CZ-NH2	-5.49	117.56	120.30	7	2
1	A	537	ASP	CB-CG-OD2	5.12	122.91	118.30	3	1

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	531	TYR	Sidechain	9

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Mol	Chain	Res	Type	Group	Models (Total)
1	A	581	ARG	Sidechain	2

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	578	551	551	1±1
All	All	12220	11720	11720	17

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 1.

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

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:523:PHE:CD1	1:A:591:ARG:HD3	0.50	2.42	10	1
1:A:524:LYS:HE2	1:A:548:LEU:CD2	0.45	2.42	14	10
1:A:524:LYS:HB2	1:A:592:VAL:HG23	0.44	1.89	3	3
1:A:527:ALA:HA	1:A:589:THR:HG22	0.42	1.91	2	3

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	71/81 (88%)	68±1 (96±1%)	3±1 (4±1%)	1±1 (1±1%)	31	76
2	B	5/17 (29%)	5±0 (100±0%)	0±0 (0±0%)	0±0 (0±0%)	100	100
All	All	1520/1960 (78%)	1459 (96%)	51 (3%)	10 (1%)	31	76

All 2 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	576	GLU	6
1	A	543	ALA	4

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	63/72 (88%)	59±1 (94±2%)	4±1 (6±2%)	28 74
2	B	4/15 (27%)	4±0 (100±0%)	0±0 (0±0%)	100 100
All	All	1340/1740 (77%)	1264 (94%)	76 (6%)	30 75

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	539	LEU	20
1	A	591	ARG	14
1	A	532	THR	12
1	A	547	VAL	8
1	A	542	LYS	6
1	A	559	ASP	4
1	A	536	THR	3
1	A	570	ASP	3
1	A	530	ASP	2
1	A	538	GLU	1
1	A	581	ARG	1
1	A	572	ASN	1
1	A	563	LEU	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 carbohydrates 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 85% for the well-defined parts and 82% for the entire structure.

7.1 Chemical shift list 1

File name: 5i22_cs.cif

Chemical shift list name: *AC.shifts*

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	1143
Number of shifts mapped to atoms	1143
Number of unparsed shifts	0
Number of shifts with mapping errors	0
Number of shifts with mapping warnings	0
Number of shift outliers (ShiftChecker)	7

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
$^{13}\text{C}_\alpha$	98	-0.98 ± 0.17	Should be applied
$^{13}\text{C}_\beta$	91	-0.77 ± 0.26	Should be applied
$^{13}\text{C}'$	0	—	—
^{15}N	86	1.65 ± 0.84	None needed (imprecise)

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 85%, i.e. 801 atoms were assigned a chemical shift out of a possible 945. 14 out of 14 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	^1H	^{13}C	^{15}N
Backbone	290/366 (79%)	145/145 (100%)	76/152 (50%)	69/69 (100%)
Sidechain	440/488 (90%)	275/287 (96%)	156/183 (85%)	9/18 (50%)

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	Total	¹H	¹³C	¹⁵N
Aromatic	71/91 (78%)	45/49 (92%)	24/38 (63%)	2/4 (50%)
Overall	801/945 (85%)	465/481 (97%)	256/373 (69%)	80/91 (88%)

The following table shows the completeness of the chemical shift assignments for the full structure. The overall completeness is 82%, i.e. 1026 atoms were assigned a chemical shift out of a possible 1254. 16 out of 17 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	¹H	¹³C	¹⁵N
Backbone	368/472 (78%)	184/187 (98%)	98/196 (50%)	86/89 (97%)
Sidechain	587/691 (85%)	368/408 (90%)	202/244 (83%)	17/39 (44%)
Aromatic	71/91 (78%)	45/49 (92%)	24/38 (63%)	2/4 (50%)
Overall	1026/1254 (82%)	597/644 (93%)	324/478 (68%)	105/132 (80%)

7.1.4 Statistically unusual chemical shifts ⓘ

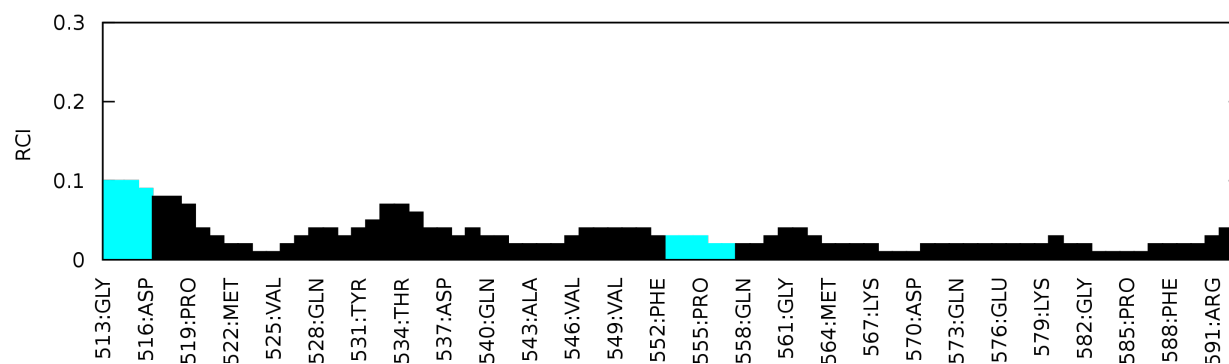
The following table lists the statistically unusual chemical shifts. These are statistical measures, and large deviations from the mean do not necessarily imply incorrect assignments. Molecules containing paramagnetic centres or hemes are expected to give rise to anomalous chemical shifts.

Mol	Chain	Res	Type	Atom	Shift, ppm	Expected range, ppm	Z-score
2	B	1736	ARG	HD3	0.68	4.36 – 1.86	-9.7
1	A	558	GLN	HB3	0.34	3.37 – 0.67	-6.2
1	A	585	PRO	HG3	0.02	3.56 – 0.26	-5.7
1	A	585	PRO	HB3	0.15	3.81 – 0.21	-5.2
2	B	1736	ARG	HG3	0.06	3.00 – 0.10	-5.2
2	B	1736	ARG	HD2	1.94	4.27 – 1.97	-5.1
1	A	518	PRO	HG3	0.26	3.56 – 0.26	-5.0

7.1.5 Random Coil Index (RCI) plots ⓘ

The images below report *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:



Random coil index (RCI) for chain B:

