W O R L D W I D E

wwPDB

P R O T E I N   D A T A   B A N K

Full wwPDB NMR Structure Validation Report (i)

May 28, 2020 – 10:11 pm BST

PDB ID	:	2JMD
Title	:	Solution Structure of the Ring Domain of Human TRAF6
Authors	:	Mercier, P.; Lewis, M.J.; Hau, D.D.; Saltibus, L.F.; Xiao, W.; Spyracopoulos, L.
Deposited on	:	2006-11-02

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 (i)) 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 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.
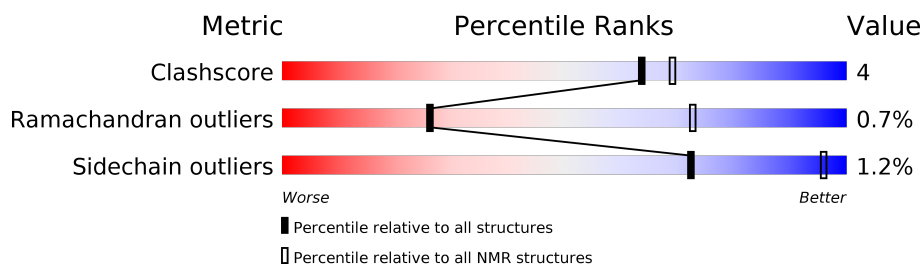
Metric	Whole archive (#Entries)	NMR archive (#Entries)
Clashscore	158937	12864
Ramachandran outliers	154571	11451
Sidechain outliers	154315	11428

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	63	68%　　10%　　22%

2 Ensemble composition and analysis (i)

This entry contains 50 models. Model 45 is the overall representative, medoid model (most similar to other models). The authors have identified model 1 as representative, based on the following criterion: *lowest energy*.

The following residues are included in the computation of the global validation metrics.

Well-defined (core) protein residues			
Well-defined core	Residue range (total)	Backbone RMSD (Å)	Medoid model
1	A:8-A:56 (49)	0.32	45

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 2 clusters and 2 single-model clusters were found.

Cluster number	Models
1	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50
2	9, 23
Single-model clusters	17; 34

3 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 976 atoms, of which 487 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called TNF receptor-associated factor 6.

Mol	Chain	Residues	Atoms						Trace
			Total	C	H	N	O	S	
1	A	63	974	307	487	86	87	7	0

There are 5 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	GLY	-	CLONING ARTIFACT	UNP Q9Y4K3
A	2	PRO	-	CLONING ARTIFACT	UNP Q9Y4K3
A	3	LEU	-	CLONING ARTIFACT	UNP Q9Y4K3
A	4	GLY	-	CLONING ARTIFACT	UNP Q9Y4K3
A	5	SER	-	CLONING ARTIFACT	UNP Q9Y4K3

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms	
			Total	Zn
2	A	2	2	2

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: TNF receptor-associated factor 6

Chain A:
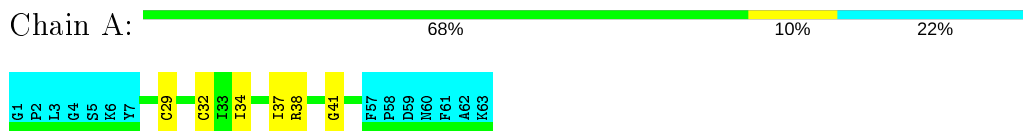
4.2   Scores per residue for each member of the ensemble

Colouring as in section 4.1 above.

4.2.1   Score per residue for model 1

- Molecule 1: TNF receptor-associated factor 6

Chain A:
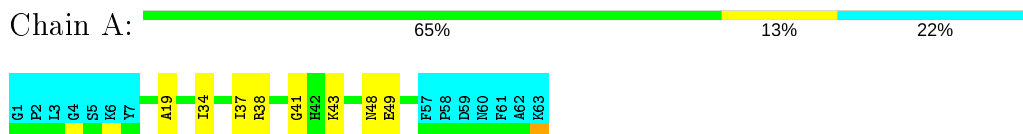
4.2.2   Score per residue for model 2

- Molecule 1: TNF receptor-associated factor 6

Chain A:
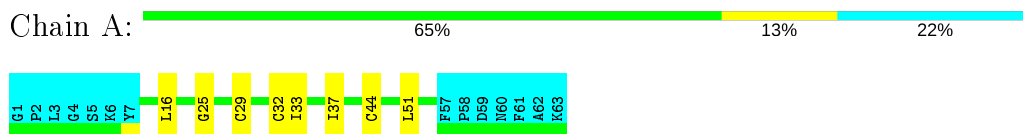
4.2.3 Score per residue for model 3
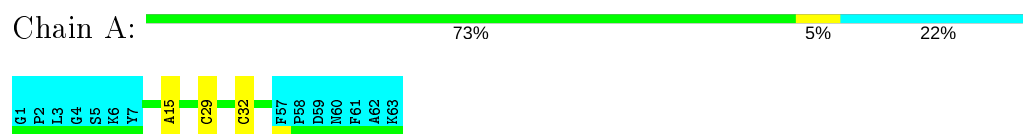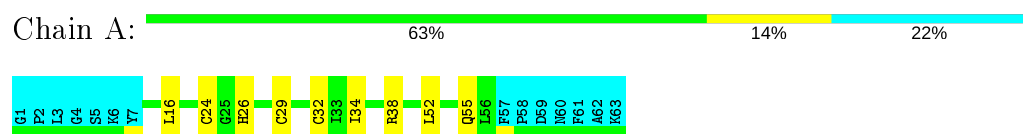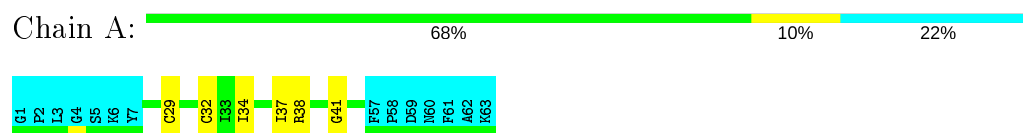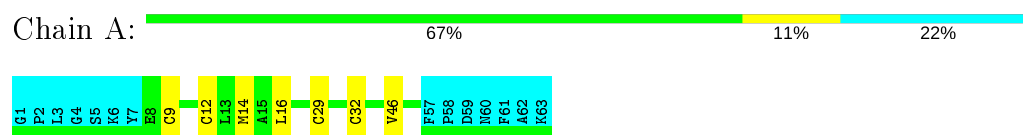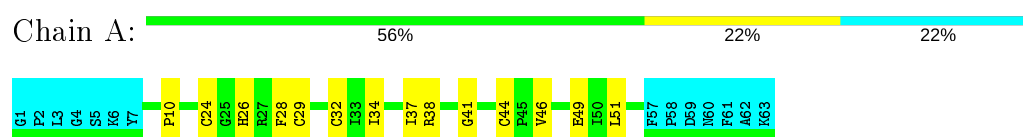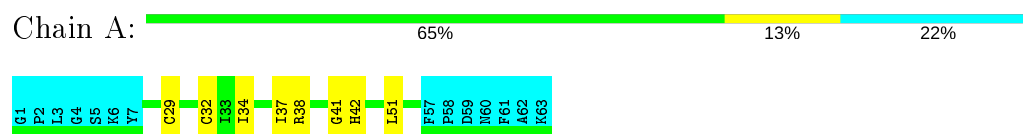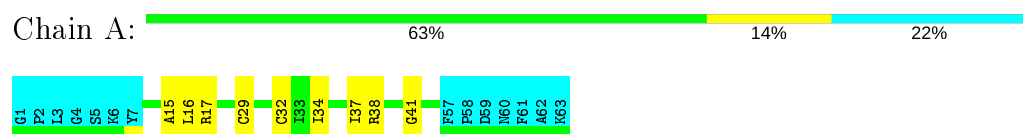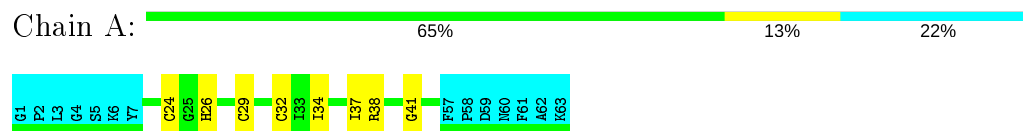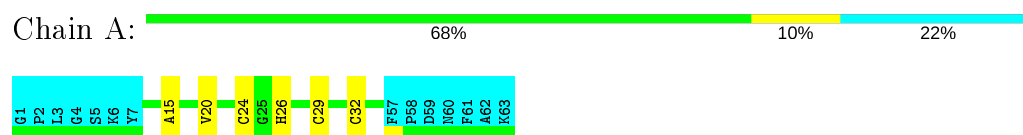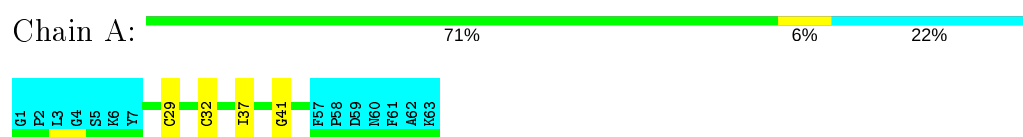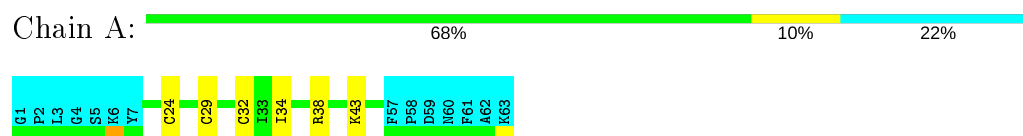
• Molecule 1: TNF receptor-associated factor 6

Chain A:

70%   8%   22%

G1 P2 L3 G4 S5 K6 Y7 A15 C29 C32 I33 I37 F57 P58 D59 N60 F61 A62 K63
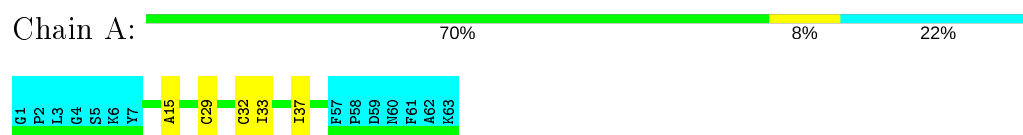
4.2.4 Score per residue for model 4

• Molecule 1: TNF receptor-associated factor 6

Chain A:

63%   14%   22%

G1 P2 L3 G4 S5 K6 Y7 E8 C9 C12 L16 C29 I34 I37 R38 G41 H42 K43 F57 P58 D59 N60 F61 A62 K63
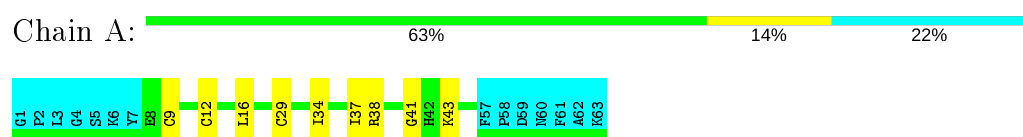
4.2.5 Score per residue for model 5

• Molecule 1: TNF receptor-associated factor 6

Chain A:

73%   5%   22%

G1 P2 L3 G4 S5 K6 Y7 A15 C29 C32 F57 P58 D59 N60 F61 A62 K63

4.2.6 Score per residue for model 6

• Molecule 1: TNF receptor-associated factor 6

Chain A:

63%   14%   22%

G1 P2 L3 G4 S5 K6 Y7 L16 C24 G25 H26 C29 C32 I33 I34 R38 L52 Q55 L56 F57 P58 D59 N60 F61 A62 K63

4.2.7 Score per residue for model 7

• Molecule 1: TNF receptor-associated factor 6

Chain A:

68%   10%   22%

G1 P2 L3 G4 S5 K6 Y7 C29 C32 I33 I34 I37 R38 G41 F57 P58 D59 N60 F61 A62 K63

4.2.8 Score per residue for model 8

• Molecule 1: TNF receptor-associated factor 6

Chain A: 67% 11% 22%

G1 P2 L3 G4 S5 K6 Y7 E8 C9 C12 I13 M14 A15 L16 C29 C32 V46 F57 P58 D59 N60 F61 A62 K63

4.2.9 Score per residue for model 9

• Molecule 1: TNF receptor-associated factor 6

Chain A: 56% 22% 22%

G1 P2 L3 G4 S5 K6 Y7 P10 C24 G25 H26 R27 F28 C29 C32 I33 I34 I37 R38 G41 C44 P45 V46 E49 I50 L51 F57 P58 D59 N60 F61 A62 K63

4.2.10 Score per residue for model 10

• Molecule 1: TNF receptor-associated factor 6

Chain A: 65% 13% 22%

G1 P2 L3 G4 S5 K6 Y7 C29 C32 I33 I34 I37 R38 G41 H42 L51 F57 P58 D59 N60 F61 A62 K63

4.2.11 Score per residue for model 11

• Molecule 1: TNF receptor-associated factor 6

Chain A: 63% 14% 22%

G1 P2 L3 G4 S5 K6 Y7 A15 L16 R17 C29 C32 I33 I34 I37 R38 G41 F57 P58 D59 N60 F61 A62 K63

4.2.12 Score per residue for model 12

• Molecule 1: TNF receptor-associated factor 6

Chain A: 65% 13% 22%

G1 P2 L3 G4 S5 K6 Y7 C24 G25 H26 C29 C32 I33 I34 I37 R38 G41 F57 P58 D59 N60 F61 A62 K63

4.2.13 Score per residue for model 13

• Molecule 1: TNF receptor-associated factor 6

Chain A:

4.2.14 Score per residue for model 14

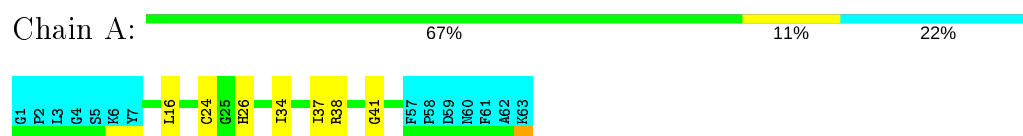• Molecule 1: TNF receptor-associated factor 6

Chain A:

4.2.15 Score per residue for model 15
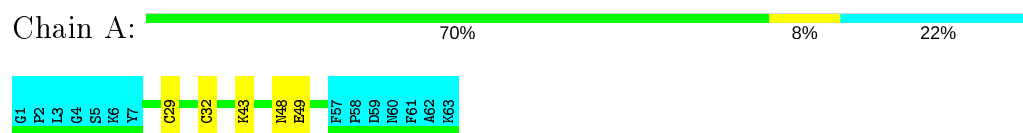
• Molecule 1: TNF receptor-associated factor 6

Chain A:

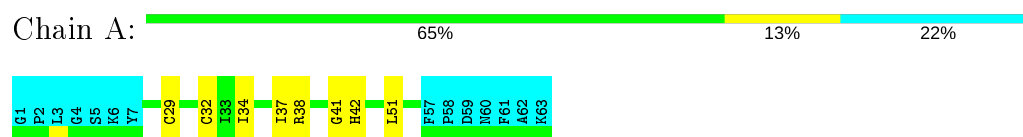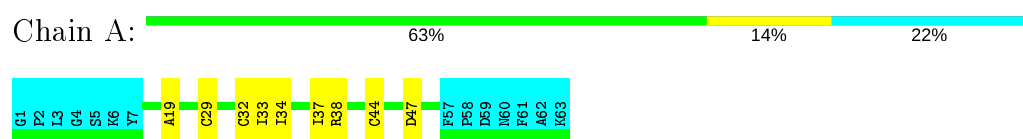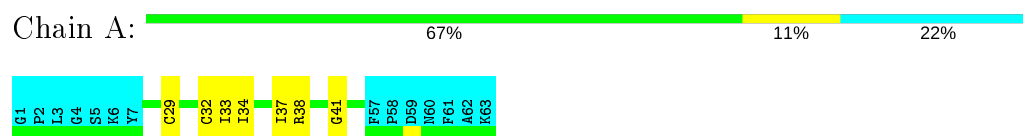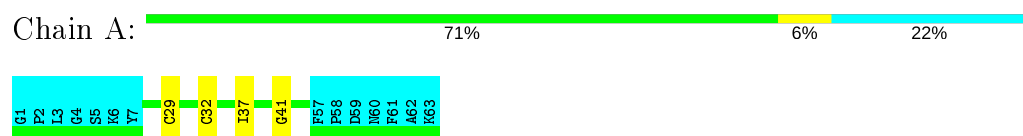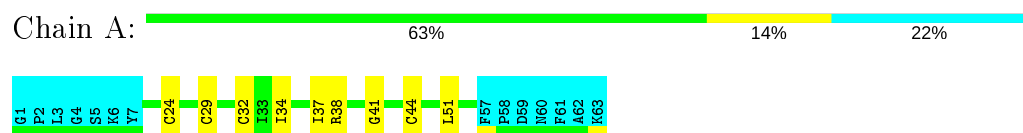#### 4.2.16 Score per residue for model 16

• Molecule 1: TNF receptor-associated factor 6

Chain A:

4.2.17 Score per residue for model 17

• Molecule 1: TNF receptor-associated factor 6

Chain A:

4.2.18 Score per residue for model 18

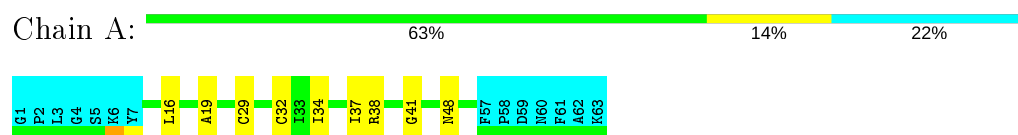• Molecule 1: TNF receptor-associated factor 6

Chain A:

4.2.19 Score per residue for model 19

• Molecule 1: TNF receptor-associated factor 6
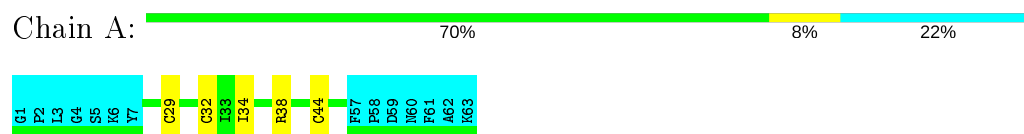
Chain A:

4.2.20 Score per residue for model 20

• Molecule 1: TNF receptor-associated factor 6

Chain A:

4.2.21 Score per residue for model 21

• Molecule 1: TNF receptor-associated factor 6

Chain A:

4.2.22 Score per residue for model 22

• Molecule 1: TNF receptor-associated factor 6

Chain A:

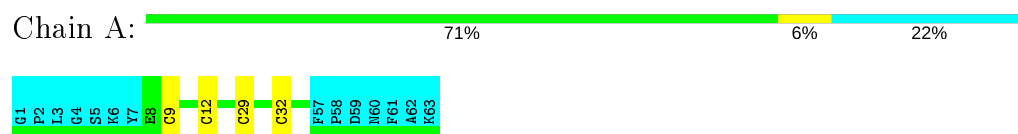### 4.2.23 Score per residue for model 23

• Molecule 1: TNF receptor-associated factor 6

Chain A:

4.2.24 Score per residue for model 24
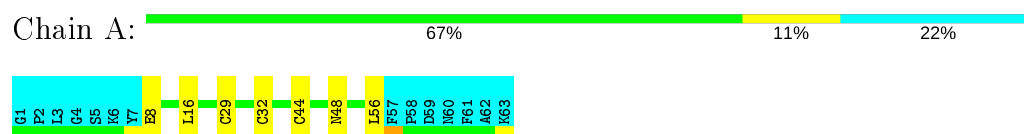
• Molecule 1: TNF receptor-associated factor 6

Chain A:

4.2.25 Score per residue for model 25

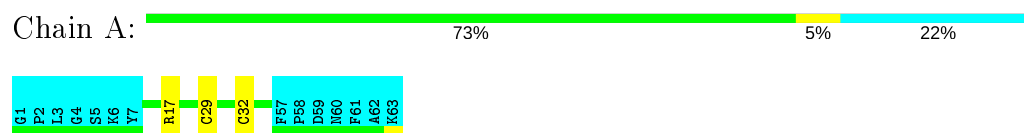• Molecule 1: TNF receptor-associated factor 6

Chain A:

4.2.26 Score per residue for model 26

• Molecule 1: TNF receptor-associated factor 6
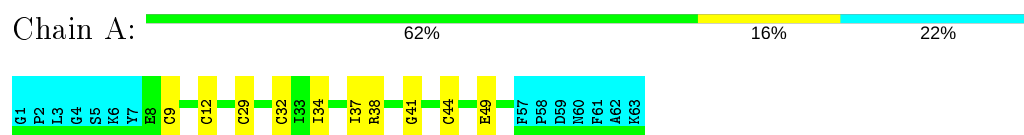
Chain A:

4.2.27 Score per residue for model 27

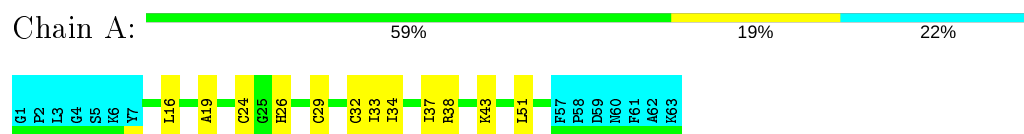• Molecule 1: TNF receptor-associated factor 6

Chain A:

4.2.28 Score per residue for model 28

• Molecule 1: TNF receptor-associated factor 6

Chain A:

4.2.29 Score per residue for model 29

• Molecule 1: TNF receptor-associated factor 6

Chain A:

4.2.30 Score per residue for model 30

• Molecule 1: TNF receptor-associated factor 6
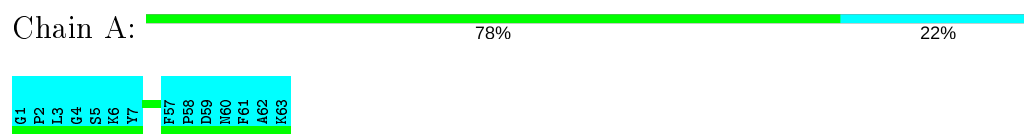
Chain A:

4.2.31 Score per residue for model 31

• Molecule 1: TNF receptor-associated factor 6

Chain A:

4.2.32 Score per residue for model 32

• Molecule 1: TNF receptor-associated factor 6

Chain A:

4.2.33 Score per residue for model 33

• Molecule 1: TNF receptor-associated factor 6
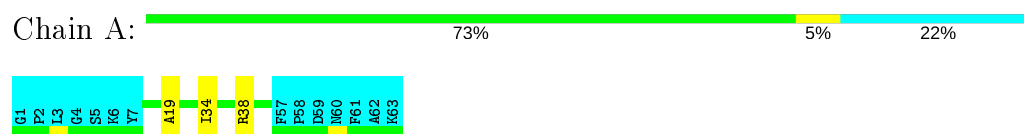
Chain A:

4.2.34 Score per residue for model 34

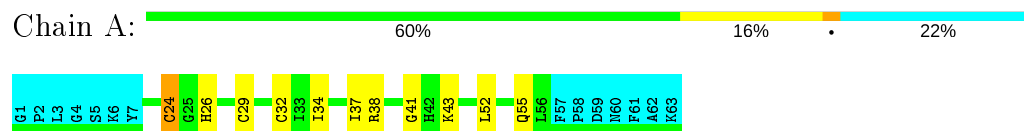• Molecule 1: TNF receptor-associated factor 6

Chain A:

4.2.35 Score per residue for model 35

• Molecule 1: TNF receptor-associated factor 6

Chain A:

4.2.36 Score per residue for model 36

• Molecule 1: TNF receptor-associated factor 6

Chain A:

4.2.37 Score per residue for model 37

• Molecule 1: TNF receptor-associated factor 6
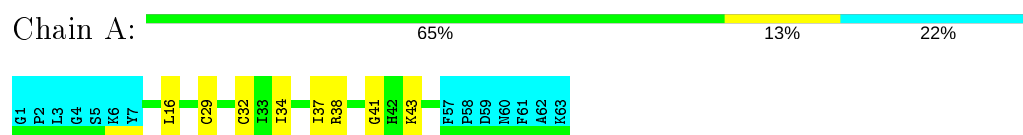
Chain A:

4.2.38 Score per residue for model 38

• Molecule 1: TNF receptor-associated factor 6
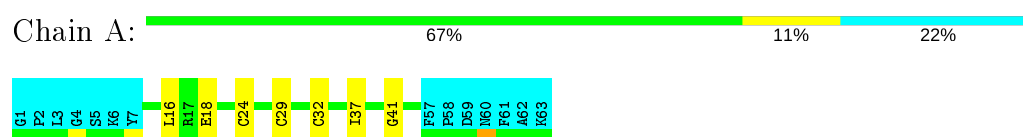
Chain A:

4.2.39 Score per residue for model 39

• Molecule 1: TNF receptor-associated factor 6

Chain A:

4.2.40 Score per residue for model 40

• Molecule 1: TNF receptor-associated factor 6

Chain A:

4.2.41 Score per residue for model 41

• Molecule 1: TNF receptor-associated factor 6
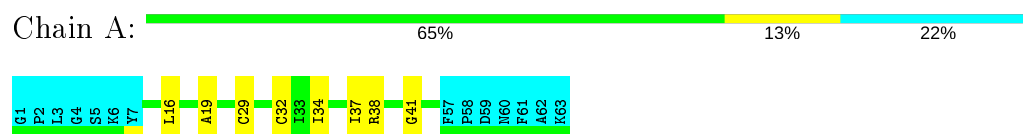
Chain A:

4.2.42 Score per residue for model 42

• Molecule 1: TNF receptor-associated factor 6

Chain A:

4.2.43 Score per residue for model 43

• Molecule 1: TNF receptor-associated factor 6

Chain A:

4.2.44 Score per residue for model 44
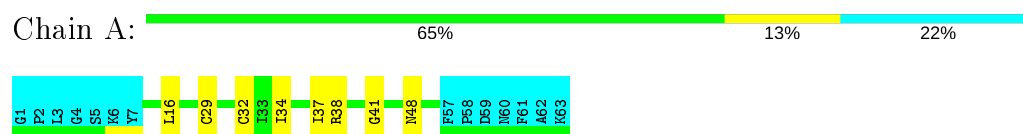
• Molecule 1: TNF receptor-associated factor 6

Chain A:
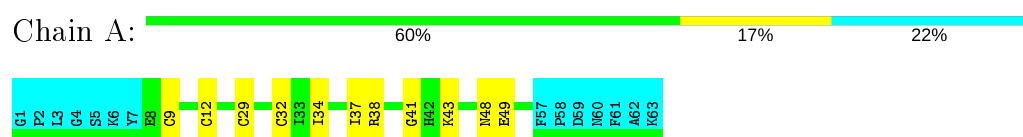
4.2.45 Score per residue for model 45 (medoid)

• Molecule 1: TNF receptor-associated factor 6
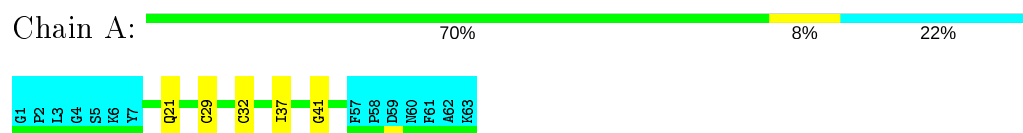
Chain A:
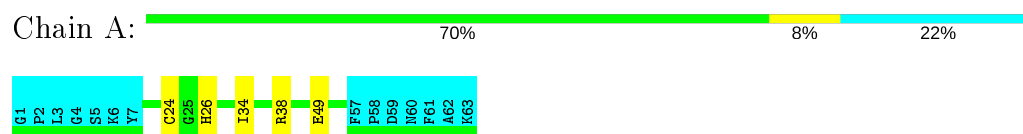
4.2.46 Score per residue for model 46

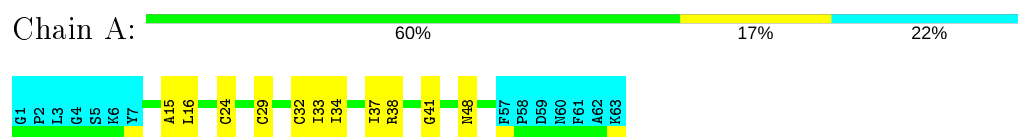• Molecule 1: TNF receptor-associated factor 6

Chain A:
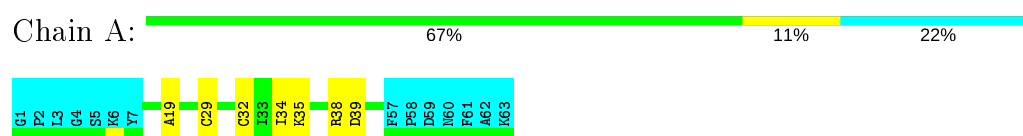
4.2.47 Score per residue for model 47

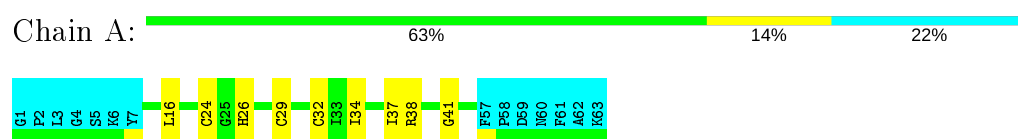• Molecule 1: TNF receptor-associated factor 6

Chain A:
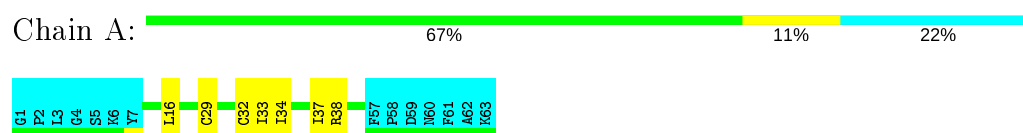
4.2.48 Score per residue for model 48

• Molecule 1: TNF receptor-associated factor 6
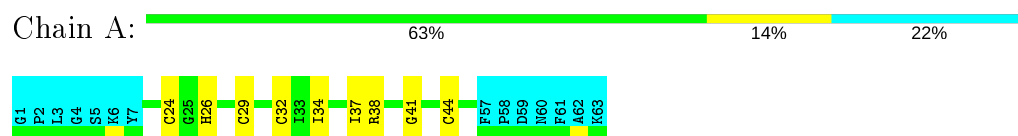
Chain A:
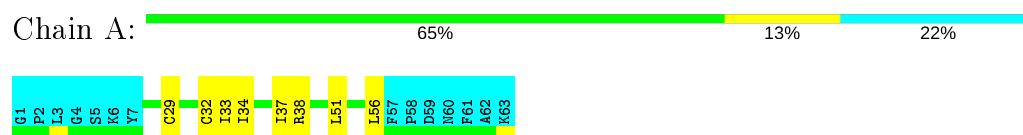
4.2.49 Score per residue for model 49

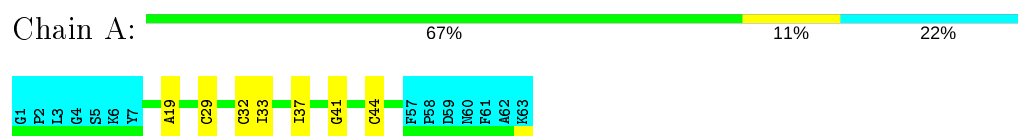• Molecule 1: TNF receptor-associated factor 6

Chain A:
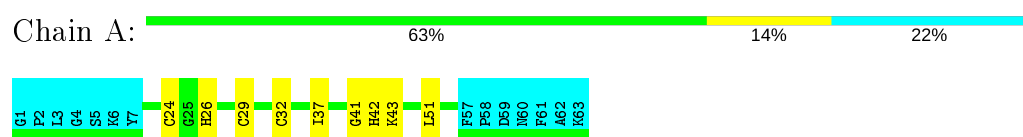
4.2.50 Score per residue for model 50
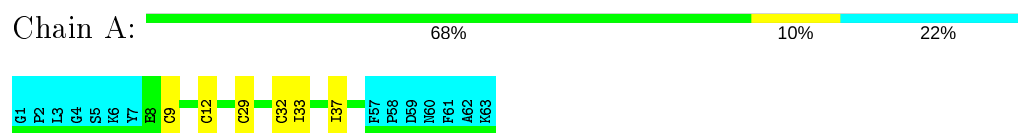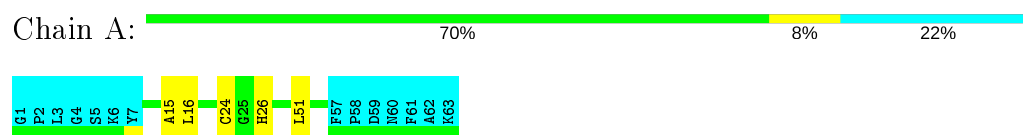
• Molecule 1: TNF receptor-associated factor 6

Chain A:
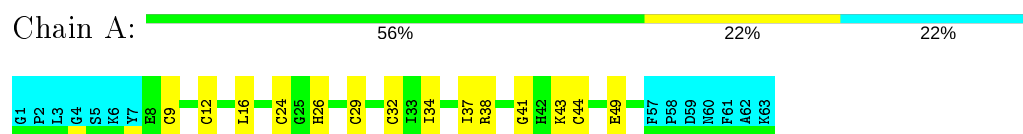
5 Refinement protocol and experimental data overview (i)

The models were refined using the following method: *torsion angle dynamics, simulated annealing*.

Of the 50 calculated structures, 50 were deposited, based on the following criterion: *all calculated structures submitted*.

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

Software name	Classification	Version
CYANA	structure solution	2.1
NMRView	structure solution	6.5
X-PLOR NIH	refinement	2.15
X-PLOR NIH	structure solution	2.15

No chemical shift data was provided. No validations of the models with respect to experimental NMR restraints is performed at this time.

6 Model quality (i)

6.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: ZN

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

There are no bond-length outliers.

There are no bond-angle outliers.

There are no chirality outliers.

There are no planarity outliers.

6.2 Too-close contacts (i)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in each chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes averaged over the ensemble.

Mol	Chain	Non-H	H(model)	H(added)	Clashes
1	A	377	381	381	3±1
All	All	18950	19050	19053	162

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 4.

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

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models Worst	Models Total
1:A:34:ILE:O	1:A:38:ARG:HG2	0.62	1.94	36	32
1:A:37:ILE:HA	1:A:41:GLY:O	0.61	1.94	9	28
1:A:24:CYS:SG	1:A:26:HIS:HD2	0.60	2.20	9	12
1:A:29:CYS:HB2	1:A:32:CYS:SG	0.59	2.37	19	43
1:A:10:PRO:HD2	1:A:28:PHE:CE1	0.56	2.36	9	1
1:A:24:CYS:SG	1:A:51:LEU:HD21	0.55	2.40	9	1
1:A:16:LEU:HA	1:A:29:CYS:SG	0.54	2.43	4	2
1:A:9:CYS:HB3	1:A:12:CYS:SG	0.53	2.44	50	7
1:A:24:CYS:HB2	1:A:49:GLU:OE1	0.51	2.06	9	1
1:A:42:HIS:HB3	1:A:51:LEU:O	0.51	2.05	49	3
1:A:33:ILE:O	1:A:37:ILE:HG12	0.49	2.06	47	8
1:A:44:CYS:HB2	1:A:47:ASP:OD1	0.48	2.08	19	1

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models Worst	Total
1:A:29:CYS:O	1:A:33:ILE:HG22	0.46	2.11	38	3
1:A:44:CYS:HB3	1:A:51:LEU:HD11	0.45	1.88	22	2
1:A:52:LEU:HB2	1:A:55:GLN:HG2	0.45	1.89	32	2
1:A:44:CYS:SG	1:A:49:GLU:HB2	0.45	2.52	28	1
1:A:35:LYS:O	1:A:39:ASP:HB2	0.45	2.12	46	1
1:A:43:LYS:HA	1:A:49:GLU:O	0.44	2.13	44	4
1:A:24:CYS:SG	1:A:26:HIS:CD2	0.44	3.11	16	3
1:A:44:CYS:O	1:A:48:ASN:HA	0.43	2.13	26	1
1:A:17:ARG:NE	1:A:17:ARG:HA	0.42	2.30	27	1
1:A:12:CYS:SG	1:A:14:MET:HG2	0.41	2.55	8	1
1:A:51:LEU:HD21	1:A:56:LEU:HD21	0.41	1.92	48	1
1:A:44:CYS:SG	1:A:51:LEU:HD12	0.41	2.56	2	1
1:A:24:CYS:HB2	1:A:26:HIS:CD2	0.40	2.52	50	1
1:A:17:ARG:HA	1:A:17:ARG:NE	0.40	2.31	11	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	49/63 (78%)	44±1 (91±3%)	4±1 (9±3%)	0±0 (1±1%)	26	73
All	All	2450/3150 (78%)	2219 (91%)	214 (9%)	17 (1%)	26	73

All 4 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	19	ALA	8
1	A	15	ALA	6
1	A	46	VAL	2
1	A	25	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	43/54 (80%)	42±1 (99±1%)	1±1 (1±1%)	72	96
All	All	2150/2700 (80%)	2124 (99%)	26 (1%)	72	96

All 8 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	43	LYS	6
1	A	48	ASN	6
1	A	24	CYS	5
1	A	44	CYS	4
1	A	51	LEU	2
1	A	21	GLN	1
1	A	49	GLU	1
1	A	8	GLU	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)

Of 2 ligands modelled in this entry, 2 are monoatomic - leaving 0 for Mogul analysis.

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