wwPDB X-ray Structure Validation Summary Report (i)

Jun 15, 2024 – 02:36 PM EDT

PDB ID	:	1R0D
Title	:	HIP1R THATCH DOMAIN CORE
Authors	:	Brett, T.J.; Fremont, D.H.; Midwest Center for Structural Genomics (MCSG)
Deposited on	:	2003-09-19
Resolution	:	1.90 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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/XrayValidationReportHelp
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:

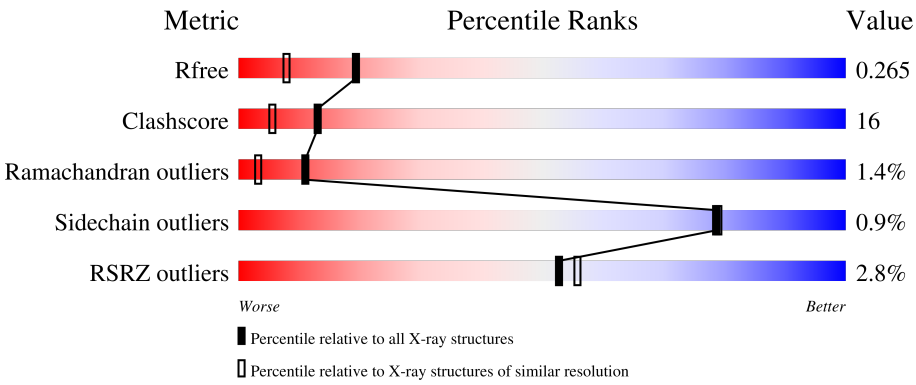
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.20.1
EDS	:	2.37.1
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.37.1

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 1.90 Å.

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)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	6207 (1.90-1.90)
Clashscore	141614	6847 (1.90-1.90)
Ramachandran outliers	138981	6760 (1.90-1.90)
Sidechain outliers	138945	6760 (1.90-1.90)
RSRZ outliers	127900	6082 (1.90-1.90)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. 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% The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	206	4% 69% 23% • 6%
1	B	206	2% 74% 17% • 8%
1	D	206	3% 74% 17% • 8%
1	E	206	2% 73% 17% • 8%
1	F	206	% 67% 23% • 8%

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Mol	Chain	Length	Quality of chain
1	G	206	2% 69% 21% • 8%
1	H	206	2% 70% 21% • 8%
1	I	206	3% 73% 19% • 6%

2 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 12737 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Huntingtin Interacting Protein 12.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	S	Se			
1	A	194	1474	897	271	298	3	5	0	0	0
1	B	190	1440	878	264	291	3	4	0	0	0
1	D	190	1440	878	264	291	3	4	0	0	0
1	E	190	1440	878	264	291	3	4	0	0	0
1	F	190	1440	878	264	291	3	4	0	0	0
1	G	190	1440	878	264	291	3	4	0	0	0
1	H	190	1440	878	264	291	3	4	0	0	0
1	I	194	1474	897	271	298	3	5	0	0	0

There are 80 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	766	GLY	-	CLONING ARTIFACT	UNP O75146
A	767	SER	-	CLONING ARTIFACT	UNP O75146
A	768	PRO	-	CLONING ARTIFACT	UNP O75146
A	769	GLU	-	CLONING ARTIFACT	UNP O75146
A	770	PHE	-	CLONING ARTIFACT	UNP O75146
A	787	MSE	MET	MODIFIED RESIDUE	UNP O75146
A	804	MSE	MET	MODIFIED RESIDUE	UNP O75146
A	805	MSE	MET	MODIFIED RESIDUE	UNP O75146
A	831	MSE	MET	MODIFIED RESIDUE	UNP O75146
A	966	MSE	MET	MODIFIED RESIDUE	UNP O75146
B	766	GLY	-	CLONING ARTIFACT	UNP O75146
B	767	SER	-	CLONING ARTIFACT	UNP O75146
B	768	PRO	-	CLONING ARTIFACT	UNP O75146

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Chain	Residue	Modelled	Actual	Comment	Reference
B	769	GLU	-	CLONING ARTIFACT	UNP O75146
B	770	PHE	-	CLONING ARTIFACT	UNP O75146
B	787	MSE	MET	MODIFIED RESIDUE	UNP O75146
B	804	MSE	MET	MODIFIED RESIDUE	UNP O75146
B	805	MSE	MET	MODIFIED RESIDUE	UNP O75146
B	831	MSE	MET	MODIFIED RESIDUE	UNP O75146
B	966	MSE	MET	MODIFIED RESIDUE	UNP O75146
D	766	GLY	-	CLONING ARTIFACT	UNP O75146
D	767	SER	-	CLONING ARTIFACT	UNP O75146
D	768	PRO	-	CLONING ARTIFACT	UNP O75146
D	769	GLU	-	CLONING ARTIFACT	UNP O75146
D	770	PHE	-	CLONING ARTIFACT	UNP O75146
D	787	MSE	MET	MODIFIED RESIDUE	UNP O75146
D	804	MSE	MET	MODIFIED RESIDUE	UNP O75146
D	805	MSE	MET	MODIFIED RESIDUE	UNP O75146
D	831	MSE	MET	MODIFIED RESIDUE	UNP O75146
D	966	MSE	MET	MODIFIED RESIDUE	UNP O75146
E	766	GLY	-	CLONING ARTIFACT	UNP O75146
E	767	SER	-	CLONING ARTIFACT	UNP O75146
E	768	PRO	-	CLONING ARTIFACT	UNP O75146
E	769	GLU	-	CLONING ARTIFACT	UNP O75146
E	770	PHE	-	CLONING ARTIFACT	UNP O75146
E	787	MSE	MET	MODIFIED RESIDUE	UNP O75146
E	804	MSE	MET	MODIFIED RESIDUE	UNP O75146
E	805	MSE	MET	MODIFIED RESIDUE	UNP O75146
E	831	MSE	MET	MODIFIED RESIDUE	UNP O75146
E	966	MSE	MET	MODIFIED RESIDUE	UNP O75146
F	766	GLY	-	CLONING ARTIFACT	UNP O75146
F	767	SER	-	CLONING ARTIFACT	UNP O75146
F	768	PRO	-	CLONING ARTIFACT	UNP O75146
F	769	GLU	-	CLONING ARTIFACT	UNP O75146
F	770	PHE	-	CLONING ARTIFACT	UNP O75146
F	787	MSE	MET	MODIFIED RESIDUE	UNP O75146
F	804	MSE	MET	MODIFIED RESIDUE	UNP O75146
F	805	MSE	MET	MODIFIED RESIDUE	UNP O75146
F	831	MSE	MET	MODIFIED RESIDUE	UNP O75146
F	966	MSE	MET	MODIFIED RESIDUE	UNP O75146
G	766	GLY	-	CLONING ARTIFACT	UNP O75146
G	767	SER	-	CLONING ARTIFACT	UNP O75146
G	768	PRO	-	CLONING ARTIFACT	UNP O75146
G	769	GLU	-	CLONING ARTIFACT	UNP O75146
G	770	PHE	-	CLONING ARTIFACT	UNP O75146

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Chain	Residue	Modelled	Actual	Comment	Reference
G	787	MSE	MET	MODIFIED RESIDUE	UNP O75146
G	804	MSE	MET	MODIFIED RESIDUE	UNP O75146
G	805	MSE	MET	MODIFIED RESIDUE	UNP O75146
G	831	MSE	MET	MODIFIED RESIDUE	UNP O75146
G	966	MSE	MET	MODIFIED RESIDUE	UNP O75146
H	766	GLY	-	CLONING ARTIFACT	UNP O75146
H	767	SER	-	CLONING ARTIFACT	UNP O75146
H	768	PRO	-	CLONING ARTIFACT	UNP O75146
H	769	GLU	-	CLONING ARTIFACT	UNP O75146
H	770	PHE	-	CLONING ARTIFACT	UNP O75146
H	787	MSE	MET	MODIFIED RESIDUE	UNP O75146
H	804	MSE	MET	MODIFIED RESIDUE	UNP O75146
H	805	MSE	MET	MODIFIED RESIDUE	UNP O75146
H	831	MSE	MET	MODIFIED RESIDUE	UNP O75146
H	966	MSE	MET	MODIFIED RESIDUE	UNP O75146
I	766	GLY	-	CLONING ARTIFACT	UNP O75146
I	767	SER	-	CLONING ARTIFACT	UNP O75146
I	768	PRO	-	CLONING ARTIFACT	UNP O75146
I	769	GLU	-	CLONING ARTIFACT	UNP O75146
I	770	PHE	-	CLONING ARTIFACT	UNP O75146
I	787	MSE	MET	MODIFIED RESIDUE	UNP O75146
I	804	MSE	MET	MODIFIED RESIDUE	UNP O75146
I	805	MSE	MET	MODIFIED RESIDUE	UNP O75146
I	831	MSE	MET	MODIFIED RESIDUE	UNP O75146
I	966	MSE	MET	MODIFIED RESIDUE	UNP O75146

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
2	A	153	153	153	0	0
			Total	O		
2	B	150	150	150	0	0
			Total	O		
2	D	150	150	150	0	0
			Total	O		
2	E	163	163	163	0	0
			Total	O		
2	F	108	108	108	0	0
			Total	O		
2	G	154	154	154	0	0
			Total	O		
2	H	122	122	122	0	0

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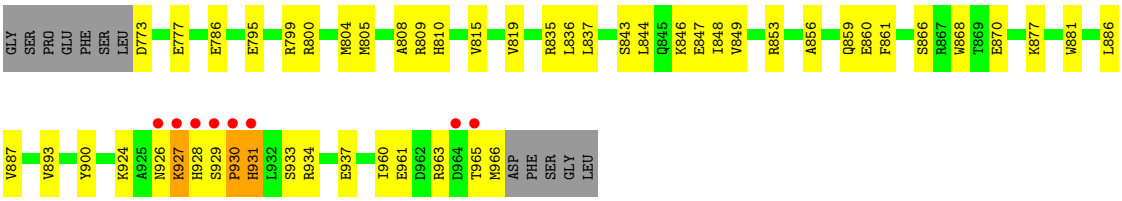
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
2	I	149	149	149	0	0

3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-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. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

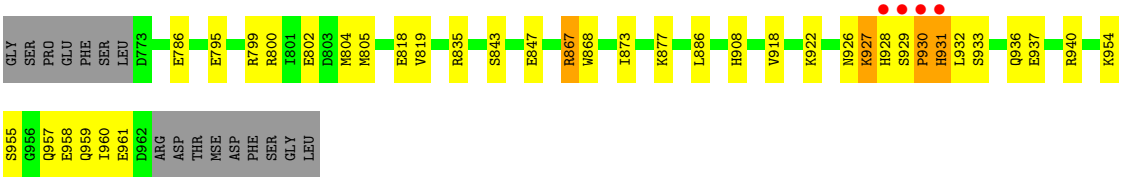
• Molecule 1: Huntingtin Interacting Protein 12

Chain A:



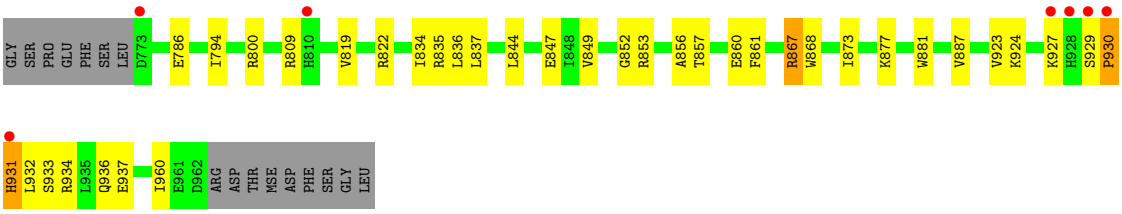
• Molecule 1: Huntingtin Interacting Protein 12

Chain B:



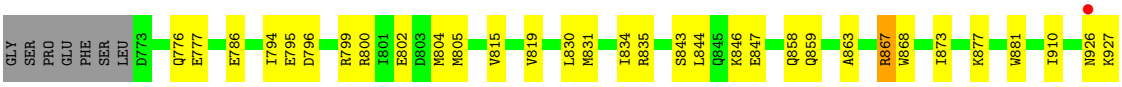
• Molecule 1: Huntingtin Interacting Protein 12

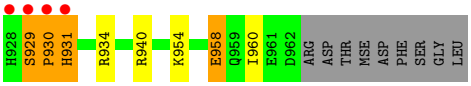
Chain D:



• Molecule 1: Huntingtin Interacting Protein 12

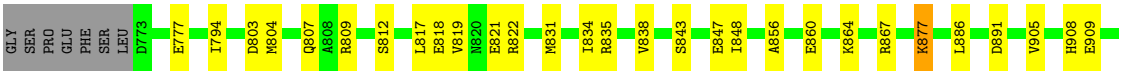
Chain E:

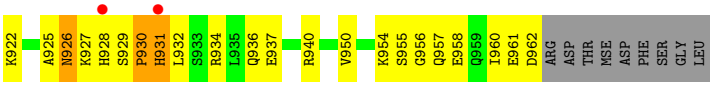




• Molecule 1: Huntingtin Interacting Protein 12

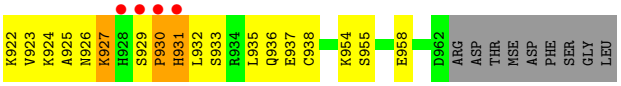
Chain F:





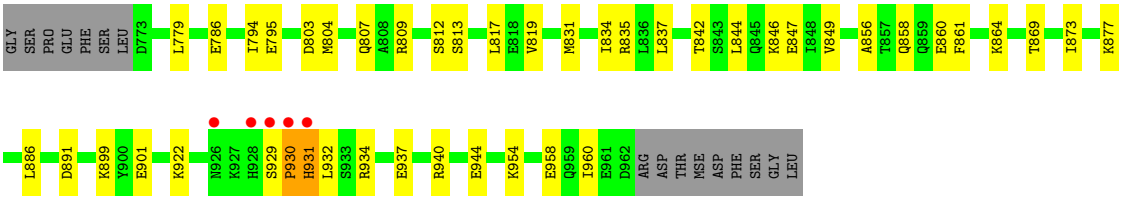
• Molecule 1: Huntingtin Interacting Protein 12

Chain G:



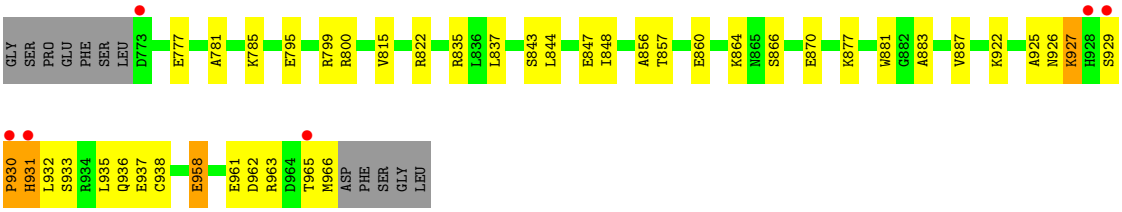
• Molecule 1: Huntingtin Interacting Protein 12

Chain H:



• Molecule 1: Huntingtin Interacting Protein 12

Chain I:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	148.20Å 165.90Å 109.80Å 90.00° 132.40° 90.00°	Depositor
Resolution (Å)	19.88 – 1.90 45.68 – 1.90	Depositor EDS
% Data completeness (in resolution range)	89.8 (19.88-1.90) 89.7 (45.68-1.90)	Depositor EDS
R_{merge}	0.04	Depositor
R_{sym}	0.04	Depositor
$< I/\sigma(I) >$ [1]	2.79 (at 1.91Å)	Xtriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.224 , 0.269 0.221 , 0.265	Depositor DCC
R_{free} test set	14633 reflections (4.88%)	wwPDB-VP
Wilson B-factor (Å^2)	26.0	Xtriage
Anisotropy	0.345	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 47.6	EDS
L-test for twinning[2]	$< \|L\| > = 0.52$, $< L^2 > = 0.35$	Xtriage
Estimated twinning fraction	0.000 for -h,h+2*l,1/2*h+1/2*k 0.000 for -h,-h-2*l,1/2*h-1/2*k 0.487 for h,-k,-h-l	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	12737	wwPDB-VP
Average B, all atoms (Å^2)	36.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 39.28 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 3.2511e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

[1]Intensities estimated from amplitudes.

[2]Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality (i)

5.1 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 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	0.49	0/1481	0.61	0/1988
1	B	0.48	0/1448	0.59	0/1946
1	D	0.50	0/1448	0.58	0/1946
1	E	0.48	0/1448	0.58	0/1946
1	F	0.43	1/1448 (0.1%)	0.56	0/1946
1	G	0.47	0/1448	0.61	0/1946
1	H	0.44	0/1448	0.57	0/1946
1	I	0.44	0/1481	0.59	0/1988
All	All	0.47	1/11650 (0.0%)	0.59	0/15652

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	F	831	MSE	SE-CE	-5.32	1.64	1.95

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 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 the 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 within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1474	0	1481	71	0
1	B	1440	0	1448	44	0
1	D	1440	0	1448	42	0
1	E	1440	0	1448	45	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	F	1440	0	1448	53	0
1	G	1440	0	1448	45	0
1	H	1440	0	1448	41	0
1	I	1474	0	1481	62	0
2	A	153	0	0	5	0
2	B	150	0	0	2	0
2	D	150	0	0	3	0
2	E	163	0	0	4	0
2	F	108	0	0	4	0
2	G	154	0	0	6	0
2	H	122	0	0	2	0
2	I	149	0	0	5	0
All	All	12737	0	11650	380	0

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 16.

The worst 5 of 380 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:929:SER:HA	1:E:931:HIS:H	1.12	1.15
1:A:929:SER:HA	1:A:931:HIS:N	1.62	1.12
1:B:929:SER:HA	1:B:931:HIS:N	1.65	1.12
1:I:929:SER:HA	1:I:931:HIS:H	0.97	1.11
1:G:847:GLU:HG2	1:G:929:SER:O	1.52	1.09

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 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 X-ray entries followed by that with respect to entries of similar resolution.

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	192/206 (93%)	184 (96%)	5 (3%)	3 (2%)	9	2
1	B	188/206 (91%)	183 (97%)	2 (1%)	3 (2%)	9	2
1	D	188/206 (91%)	181 (96%)	5 (3%)	2 (1%)	14	5
1	E	188/206 (91%)	182 (97%)	3 (2%)	3 (2%)	9	2
1	F	188/206 (91%)	180 (96%)	5 (3%)	3 (2%)	9	2
1	G	188/206 (91%)	184 (98%)	2 (1%)	2 (1%)	14	5
1	H	188/206 (91%)	180 (96%)	6 (3%)	2 (1%)	14	5
1	I	192/206 (93%)	185 (96%)	4 (2%)	3 (2%)	9	2
All	All	1512/1648 (92%)	1459 (96%)	32 (2%)	21 (1%)	11	3

5 of 21 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	927	LYS
1	B	930	PRO
1	B	931	HIS
1	F	930	PRO
1	F	931	HIS

5.3.2 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 X-ray entries followed by that with respect to entries of similar resolution.

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	159/164 (97%)	159 (100%)	0	100	100
1	B	155/164 (94%)	153 (99%)	2 (1%)	69	68
1	D	155/164 (94%)	154 (99%)	1 (1%)	86	87
1	E	155/164 (94%)	152 (98%)	3 (2%)	57	53
1	F	155/164 (94%)	153 (99%)	2 (1%)	69	68
1	G	155/164 (94%)	153 (99%)	2 (1%)	69	68
1	H	155/164 (94%)	155 (100%)	0	100	100
1	I	159/164 (97%)	158 (99%)	1 (1%)	86	87

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	1248/1312 (95%)	1237 (99%)	11 (1%)	78 79

5 of 11 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	F	962	ASP
1	G	773	ASP
1	I	958	GLU
1	G	927	LYS
1	E	867	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 21 such sidechains are listed below:

Mol	Chain	Res	Type
1	H	885	GLN
1	H	957	GLN
1	I	957	GLN
1	I	936	GLN
1	H	943	ASN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains (i)

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

There are no ligands in this entry.

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data (i)

6.1 Protein, DNA and RNA chains (i)

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	A	189/206 (91%)	-0.08	8 (4%)	36	39	17, 30, 67, 104	0
1	B	186/206 (90%)	-0.28	4 (2%)	62	64	17, 29, 55, 94	0
1	D	186/206 (90%)	-0.10	7 (3%)	40	43	17, 30, 63, 92	0
1	E	186/206 (90%)	-0.25	5 (2%)	54	57	18, 30, 54, 83	0
1	F	186/206 (90%)	-0.12	2 (1%)	80	82	19, 34, 62, 94	0
1	G	186/206 (90%)	-0.14	5 (2%)	54	57	20, 32, 56, 89	0
1	H	186/206 (90%)	-0.10	5 (2%)	54	57	19, 34, 63, 93	0
1	I	189/206 (91%)	-0.15	6 (3%)	47	50	19, 32, 64, 90	0
All	All	1494/1648 (90%)	-0.15	42 (2%)	53	56	17, 32, 64, 104	0

The worst 5 of 42 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	930	PRO	8.5
1	A	929	SER	7.4
1	I	931	HIS	7.3
1	A	926	ASN	7.2
1	G	931	HIS	7.1

6.2 Non-standard residues in protein, DNA, RNA chains (i)

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

6.4 Ligands (i)

There are no ligands in this entry.

6.5 Other polymers (i)

There are no such residues in this entry.