WORLDWIDE PDB

PROTEIN DATA BANK

wwPDB X-ray Structure Validation Summary Report ⓘ

May 13, 2020 – 05:12 am BST

PDB ID	:	1JMC
Title	:	SINGLE STRANDED DNA-BINDING DOMAIN OF HUMAN REPLICA-TION PROTEIN A BOUND TO SINGLE STRANDED DNA, RPA70 SUB-UNIT, RESIDUES 183-420
Authors	:	Bochkarev, A.; Pfuetzner, R.; Edwards, A.; Frappier, L.
Deposited on	:	1996-11-11
Resolution	:	2.40 Å(reported)

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

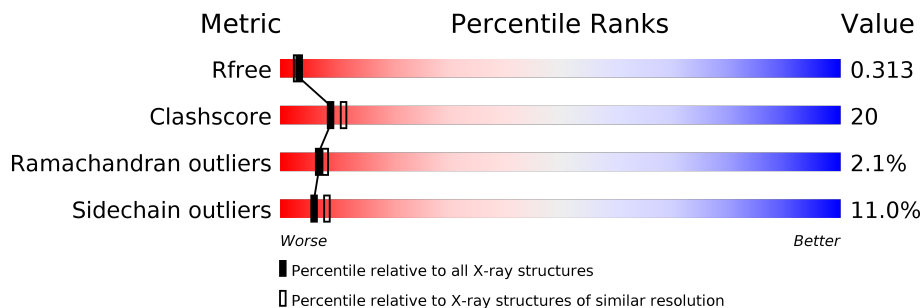|		
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.11
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

1 Overall quality at a glance ⓘ

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

The reported resolution of this entry is 2.40 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	Percentile Ranks	Value
Rfree		0.313
Clashscore		20
Ramachandran outliers		2.1%
Sidechain outliers		11.0%

Worse   *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	3907 (2.40-2.40)
Clashscore	141614	4398 (2.40-2.40)
Ramachandran outliers	138981	4318 (2.40-2.40)
Sidechain outliers	138945	4319 (2.40-2.40)

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 on 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%

Mol	Chain	Length	Quality of chain
1	B	8	38% 50% 13%
2	A	246	58% 30% 9% •

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 2751 atoms, of which 631 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 DNA chain called DNA (5'-D(*CP*CP*CP*CP*CP*CP*CP*C)-3').

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	B	8	Total	C	H	N	O	P	0	0	0
			169	72	17	24	48	8			

- Molecule 2 is a protein called PROTEIN (REPLICATION PROTEIN A (RPA)).

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
2	A	238	Total	C	H	N	O	S	0	0	0
			2312	1185	434	318	369	6			

- Molecule 3 is water.

| Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	B	11	Total	H	O	0	0
			33	22	11		
3	A	79	Total	H	O	0	0
			237	158	79		

3 Residue-property plots ⓘ

These plots are drawn for all protein, RNA and DNA 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. 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. 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: DNA (5'-D(*CP*CP*CP*CP*CP*CP*CP*C)-3')

Chain B:

• Molecule 2: PROTEIN (REPLICATION PROTEIN A (RPA))

Chain A:
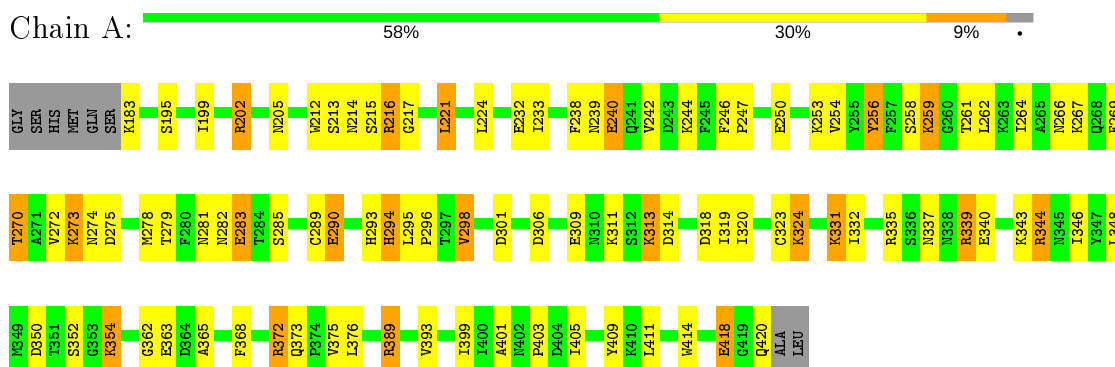
4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	34.25Å 77.99Å 95.36Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	6.00 − 2.40 8.00 − 2.20	Depositor EDS
% Data completeness (in resolution range)	95.5 (6.00-2.40) 95.1 (8.00-2.20)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	9.22 (at 2.21Å)	Xtriage
Refinement program	X-PLOR	Depositor
R, R_{free}	0.100 , 0.330 0.200 , 0.313	Depositor DCC
R_{free} test set	1306 reflections (10.35%)	wwPDB-VP
Wilson B-factor (Å^2)	18.9	Xtriage
Anisotropy	0.454	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.50 , 74.2	EDS
L-test for twinning[2]	$< |L| > = 0.47$, $< L^2 > = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.90	EDS
Total number of atoms	2751	wwPDB-VP
Average B, all atoms (Å^2)	12.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 9.18% of the height of the origin peak. No significant pseudotranslation is detected.*

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[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 ⓘ

5.1 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 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	B	1.78	2/167 (1.2%)	2.20	7/252 (2.8%)
2	A	0.60	0/1914	0.77	0/2589
All	All	0.76	2/2081 (0.1%)	0.98	7/2841 (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 outliers	#Planarity outliers
1	B	0	1
2	A	0	8
All	All	0	9

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	14	DC	P-O5'	8.24	1.68	1.59
1	B	14	DC	C5'-C4'	7.75	1.59	1.51

The worst 5 of 7 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	17	DC	O4'-C1'-N1	13.50	117.45	108.00
1	B	13	DC	O4'-C1'-N1	11.45	116.02	108.00
1	B	17	DC	P-O3'-C3'	8.49	129.89	119.70
1	B	11	DC	P-O3'-C3'	8.25	129.60	119.70
1	B	11	DC	N1-C2-O2	6.77	122.96	118.90

There are no chirality outliers.

5 of 9 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	A	183	LYS	Mainchain
2	A	256	TYR	Sidechain
2	A	293	HIS	Peptide
2	A	309	GLU	Mainchain
1	B	13	DC	Sidechain

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	B	152	17	89	10	0
2	A	1878	434	1852	73	0
3	A	79	158	0	5	0
3	B	11	22	0	0	0
All	All	2120	631	1941	79	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 20.

The worst 5 of 79 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)
2:A:306:ASP:HB3	2:A:354:LYS:HE3	1.46	0.97
2:A:331:LYS:HD3	2:A:340:GLU:HB3	1.53	0.90
2:A:389:ARG:HG2	2:A:389:ARG:HH11	1.45	0.82
2:A:403:PRO:HB2	2:A:405:ILE:HG12	1.64	0.80
2:A:202:ARG:HD2	2:A:296:PRO:O	1.90	0.71

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
2	A	236/246 (96%)	216 (92%)	15 (6%)	5 (2%)	7 8

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	A	216	ARG
2	A	294	HIS
2	A	215	SER
2	A	239	ASN
2	A	259	LYS

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
2	A	209/215 (97%)	186 (89%)	23 (11%)	6 8

5 of 23 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	A	290	GLU
2	A	298	VAL
2	A	389	ARG
2	A	294	HIS
2	A	313	LYS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
2	A	208	GLN
2	A	266	ASN
2	A	373	GLN

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 carbohydrates 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)

Unable to reproduce the depositors R factor - this section is therefore empty.

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

Unable to reproduce the depositors R factor - this section is therefore empty.

6.3 Carbohydrates (i)

Unable to reproduce the depositors R factor - this section is therefore empty.

6.4 Ligands (i)

Unable to reproduce the depositors R factor - this section is therefore empty.

6.5 Other polymers (i)

Unable to reproduce the depositors R factor - this section is therefore empty.