wwPDB EM Validation Summary Report (i)

Jul 9, 2025 – 12:58 PM JST

PDB ID	:	8YJZ / pdb_00008yjz
EMDB ID	:	EMD-39354
Title	:	Structure of the human endogenous PCNA-FEN1-RNase H2 complex - State D
Authors	:	Tian, Y.; Gao, N.
Deposited on	:	2024-03-03
Resolution	:	5.15 Å(reported)

This is a wwPDB EM 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/EMValidationReportHelp
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:

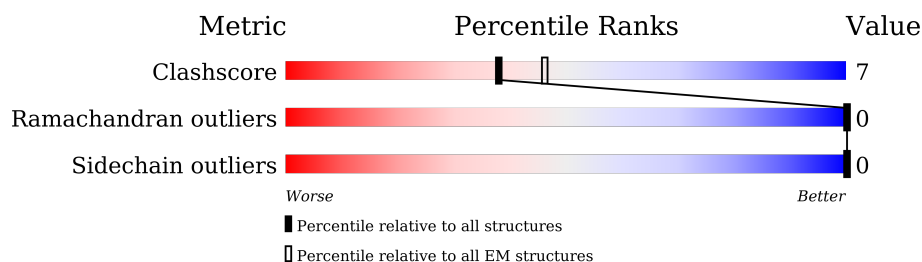|		
EMDB validation analysis	:	FAILED
MolProbity	:	4-5-2 with Phenix2.0rc1
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	FAILED
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.44

1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 5.15 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
Clashscore		7
Ramachandran outliers		0
Sidechain outliers		0

Worse   *Better*

▮ Percentile relative to all structures
▯ Percentile relative to all EM structures

Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the 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	A	261	74% 23% •
1	B	261	75% 23% •
1	C	261	75% 23% •
2	D	380	76% 17% 7%
3	H	299	86% 14%
4	G	312	54% 9% 37%
5	I	164	62% 13% • 24%
6	J	20	80% 20%
7	E	31	74% 26%

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Mol	Chain	Length	Quality of chain
8	F	14	71%　　　　　　　　　　　　　29%

2 Entry composition ⓘ

There are 8 unique types of molecules in this entry. The entry contains 14948 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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 Proliferating cell nuclear antigen.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	B	257	Total	C	N	O	S	0	0
			1980	1242	324	398	16		
1	C	257	Total	C	N	O	S	0	0
			1980	1242	324	398	16		
1	A	256	Total	C	N	O	S	0	0
			1972	1238	323	395	16		

- Molecule 2 is a protein called Flap endonuclease 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	D	354	Total	C	N	O	S	0	0
			2791	1756	489	530	16		

- Molecule 3 is a protein called Ribonuclease H2 subunit A.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	H	299	Total	C	N	O	S	0	0
			2348	1483	401	453	11		

- Molecule 4 is a protein called Ribonuclease H2 subunit B.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	G	196	Total	C	N	O	S	0	0
			1598	1046	265	281	6		

- Molecule 5 is a protein called Ribonuclease H2 subunit C.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	I	125	Total	C	N	O	S	0	0
			951	609	172	167	3		

- Molecule 6 is a DNA chain called upstream DNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	J	20	Total 407	C 200	N 61	O 126	P 20	0	0

- Molecule 7 is a DNA chain called parent strand DNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	E	31	Total 637	C 310	N 122	O 175	P 30	0	0

- Molecule 8 is a DNA chain called downstream DNA.

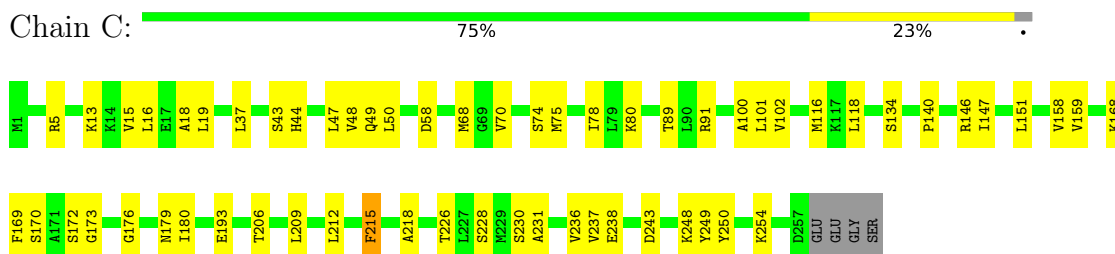| Mol	Chain	Residues	Atoms					AltConf	Trace
8	F	14	Total 284	C 140	N 40	O 90	P 14	0	0

W O R L D W I D E
wwPDB
PROTEIN DATA BANK

3   Residue-property plots ⓘ

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. 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.
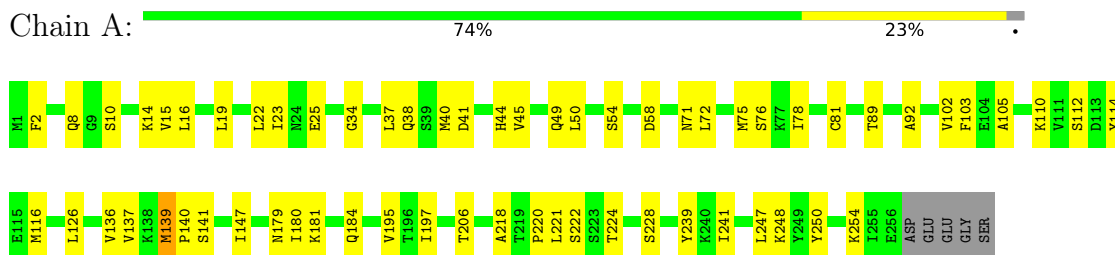
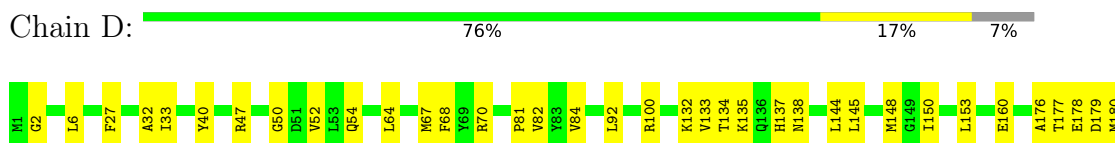- Molecule 1: Proliferating cell nuclear antigen
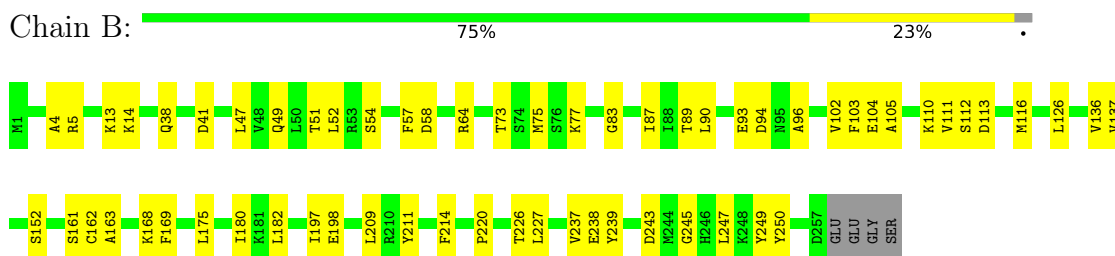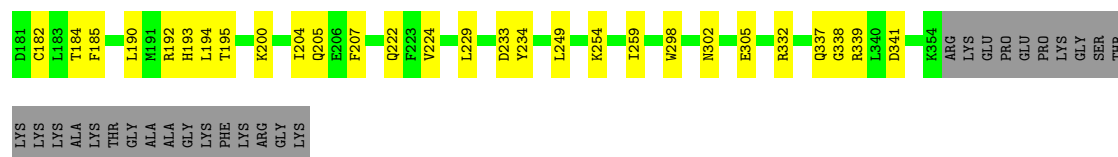
Chain B:

- Molecule 1: Proliferating cell nuclear antigen

Chain C:

- Molecule 1: Proliferating cell nuclear antigen
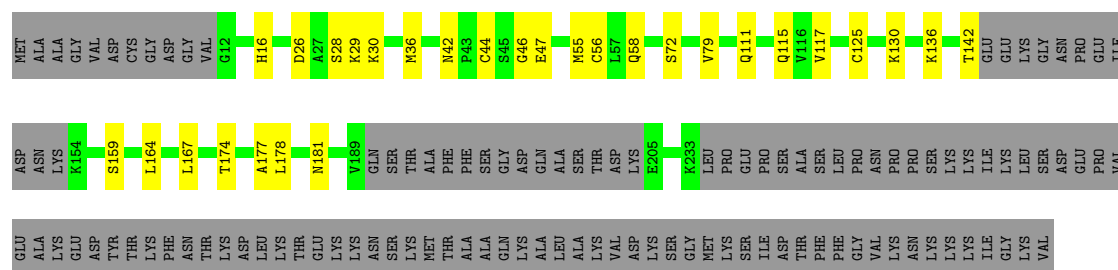
Chain A:

- Molecule 2: Flap endonuclease 1

Chain D:

D181 C182 L183 T184 F185 L190 M191 R192 H193 L194 T195 K200 I204 Q205 E206 F207 Q222 F223 V224 L229 D233 Y234 L249 K254 I259 W298 N302 E305 R332 Q337 G338 R339 L340 D341 K354 ARG LYS GLU PRO GLU PRO LYS GLY SER THR

LYS LYS LYS ALA LYS THR GLY ALA ALA GLY LYS PHE LYS ARG GLY LYS

• Molecule 3: Ribonuclease H2 subunit A

Chain H: 86% 14%

M1 G12 L31 G37 G43 P44 M45 V46 I49 S68 E75 R76 E77 R78 L79 V95 L96 L100 M105 L106 G107 R108 V109 K110 Y111 N114 D119 L124 V138 D141 Y149 A168 S176 I180 W219 E222 V227

R235 E250 W254 A258 R266 K267 I268 Y271 R280 P281 L299

• Molecule 4: Ribonuclease H2 subunit B

Chain G: 54% 9% 37%

MET ALA ALA GLY VAL ASP CYS GLY ASP GLY VAL G12 H16 D26 A27 S28 K29 K30 M36 N42 P43 C44 S45 G46 E47 M55 C56 L57 Q58 S72 V79 Q111 Q115 V116 V117 C125 K130 K136 T142 GLU GLU LYS GLY ASN PRO GLU ILE

ASP ASN LYS K154 S159 L164 L167 T174 A177 L178 N181 V189 GLN SER THR ALA PHE SER GLY ASP GLN ALA SER THR ASP LYS E205 K233 LEU PRO GLU PRO SER ALA SER LEU PRO ASN PRO SER LYS ILE LYS LEU ASP GLU PRO VAL

GLU ALA LYS GLU ASP TYR THR LYS PHE ASN THR LYS ASP LEU LYS THR GLU LYS ASN SER LYS MET THR ALA ALA GLN LYS ALA LEU ALA LYS VAL ASP LYS SER GLY MET LYS SER ILE ASP THR PHE PHE GLY VAL LYS ASN LYS LYS ILE GLY LYS VAL

• Molecule 5: Ribonuclease H2 subunit C

Chain I: 62% 13% 24%

MET GLU SER GLY ASP GLU ALA ALA ILE GLU ARG H12 H15 R22 H30 L31 L32 P33 C34 A37 V38 A42 R66 R69 V75 P76 M84 E87 GLU LYS LYS VAL SER MET GLY LYS PRO ASP PRO LEU ARG ASP SER GLY THR ASP ASP GLN GLU GLU

GLU PRO LEU GLU ARG ASP F116 I120 W132 G133 L134 E135 P138 A142 A154 I157 E163 D164
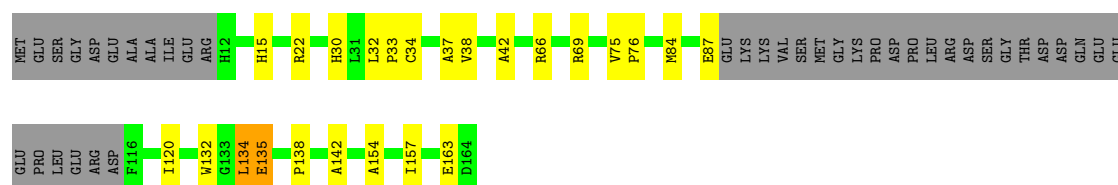
• Molecule 6: upstream DNA

Chain J: 80% 20%

A3 T6 T7 T8 T11 T22
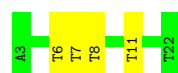
• Molecule 7: parent strand DNA

Chain E: 74% 26%

A1 A10 A11 A12 T20 A21 A22 A23 A27 T31
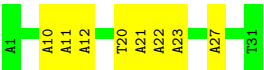
• Molecule 8: downstream DNA

Chain F:

71%   29%

T4 T5 T6 T7 A16 T17
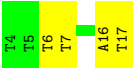
4   Experimental information ⓘ

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	13906	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose $(e^-/\text{Å}^2)$	60	Depositor
Minimum defocus (nm)	2000	Depositor
Maximum defocus (nm)	3000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor

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	A	0.22	0/1998	0.60	1/2699 (0.0%)
1	B	0.20	0/2006	0.51	0/2710
1	C	0.23	0/2006	0.63	1/2710 (0.0%)
2	D	0.21	0/2838	0.56	0/3813
3	H	0.22	0/2397	0.59	0/3253
4	G	0.20	0/1634	0.53	0/2201
5	I	0.26	0/977	0.61	3/1334 (0.2%)
6	J	0.21	0/453	0.45	0/697
7	E	0.22	0/718	0.45	0/1106
8	F	0.23	0/315	0.52	0/484
All	All	0.22	0/15342	0.56	5/21007 (0.0%)

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
5	I	135	GLU	CA-CB-CG	7.78	129.66	114.10
5	I	134	LEU	CA-C-N	5.79	132.60	121.54
5	I	134	LEU	C-N-CA	5.79	132.60	121.54
1	C	215	PHE	N-CA-CB	5.29	117.65	109.98
1	A	139	MET	CA-CB-CG	5.07	124.23	114.10

There are no chirality outliers.

There are no planarity outliers.

5.2 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 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	1972	0	1979	38	0
1	B	1980	0	1983	34	0
1	C	1980	0	1983	38	0
2	D	2791	0	2822	37	0
3	H	2348	0	2323	27	0
4	G	1598	0	1641	21	0
5	I	951	0	947	18	0
6	J	407	0	234	4	0
7	E	637	0	354	6	0
8	F	284	0	165	3	0
All	All	14948	0	14431	204	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 7.

The worst 5 of 204 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:D:177:THR:HG22	2:D:179:ASP:H	1.59	0.64
2:D:192:ARG:HB3	2:D:205:GLN:HB2	1.80	0.64
1:A:103:PHE:HB2	1:A:112:SER:HB2	1.81	0.62
4:G:36:MET:HG3	5:I:15:HIS:HA	1.84	0.60
1:C:89:THR:HB	1:C:102:VAL:HB	1.85	0.59

There are no symmetry-related clashes.

5.3   Torsion angles ⓘ

5.3.1   Protein backbone ⓘ

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 EM 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	254/261 (97%)	245 (96%)	9 (4%)	0	100	100
1	B	255/261 (98%)	250 (98%)	5 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	C	255/261 (98%)	243 (95%)	12 (5%)	0	100	100
2	D	352/380 (93%)	338 (96%)	14 (4%)	0	100	100
3	H	297/299 (99%)	277 (93%)	20 (7%)	0	100	100
4	G	190/312 (61%)	183 (96%)	7 (4%)	0	100	100
5	I	121/164 (74%)	118 (98%)	3 (2%)	0	100	100
All	All	1724/1938 (89%)	1654 (96%)	70 (4%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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 EM 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	224/228 (98%)	224 (100%)	0	100	100
1	B	225/228 (99%)	225 (100%)	0	100	100
1	C	225/228 (99%)	225 (100%)	0	100	100
2	D	303/322 (94%)	303 (100%)	0	100	100
3	H	257/257 (100%)	257 (100%)	0	100	100
4	G	179/277 (65%)	179 (100%)	0	100	100
5	I	98/132 (74%)	98 (100%)	0	100	100
All	All	1511/1672 (90%)	1511 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

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	C	177	ASN
1	A	177	ASN
1	A	213	ASN
1	A	184	GLN

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Mol	Chain	Res	Type
1	A	49	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

There are no ligands in this entry.

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.