WORLDWIDE PDB PROTEIN DATA BANK

wwPDB X-ray Structure Validation Summary Report ⓘ

Jan 31, 2016 – 10:43 PM GMT

PDB ID : 1UVI

Title : THE STRUCTURAL BASIS FOR RNA SPECIFICITY AND CA2 INHI-BITION OF AN RNA-DEPENDENT RNA POLYMERASE PHI6P2 WITH 6NT RNA

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Deposited on : 2004-01-21

Resolution : 2.15 Å(reported)

The following versions of software and data (see references ①) were used in the production of this report:

|		
MolProbity	:	4.02b-467
Mogul	:	1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix)	:	1.9-1692
EDS	:	rb-20026688
Percentile statistics	:	20151230.v01 (using entries in the PDB archive December 30th 2015)
Refmac	:	5.8.0135
CCP4	:	6.5.0
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	trunk26865

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 2.15 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.
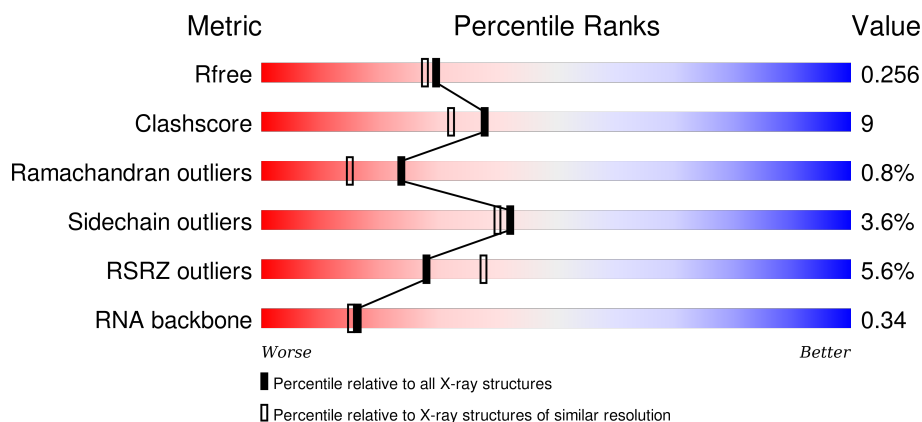
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	91344	1045 (2.16-2.16)
Clashscore	102246	1152 (2.16-2.16)
Ramachandran outliers	100387	1131 (2.16-2.16)
Sidechain outliers	100360	1131 (2.16-2.16)
RSRZ outliers	91569	1050 (2.16-2.16)
RNA backbone	2183	1077 (2.80-1.52)

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. 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	664	5% / 82% / 15% / •
1	B	664	3% / 81% / 17% / •
1	C	664	7% / 82% / 16% / •
2	D	6	67% / 17% / 33% / 17% / 33%

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Mol	Chain	Length	Quality of chain
2	E	6	67% 17% 33% 17% 33%
2	F	6	67% 17% 33% 17% 33%

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 16447 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 RNA-DEPENDENT RNA POLYMERASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	664	Total 5265	C 3342	N 914	O 977	S 32	0	0	0
1	B	664	Total 5265	C 3342	N 914	O 977	S 32	0	0	0
1	C	664	Total 5265	C 3342	N 914	O 977	S 32	0	0	0

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	456	MET	ILE	CONFLICT	UNP P11124
B	456	MET	ILE	CONFLICT	UNP P11124
C	456	MET	ILE	CONFLICT	UNP P11124

- Molecule 2 is a RNA chain called 5'-R(*UP*UP*UP*UP*CP*CP)-3'.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	D	4	Total 77	C 36	N 10	O 28	P 3	0	0	0
2	E	4	Total 77	C 36	N 10	O 28	P 3	0	0	0
2	F	4	Total 77	C 36	N 10	O 28	P 3	0	0	0

- Molecule 3 is MANGANESE (II) ION (three-letter code: MN) (formula: Mn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	B	1	Total 1	Mn 1	0	0
3	A	1	Total 1	Mn 1	0	0

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	C	1	Total 1	Mn 1	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	116	Total 116	O 116	0	0
4	B	192	Total 192	O 192	0	0
4	C	109	Total 109	O 109	0	0
4	D	1	Total 1	O 1	0	0

3 Residue-property plots ⓘ

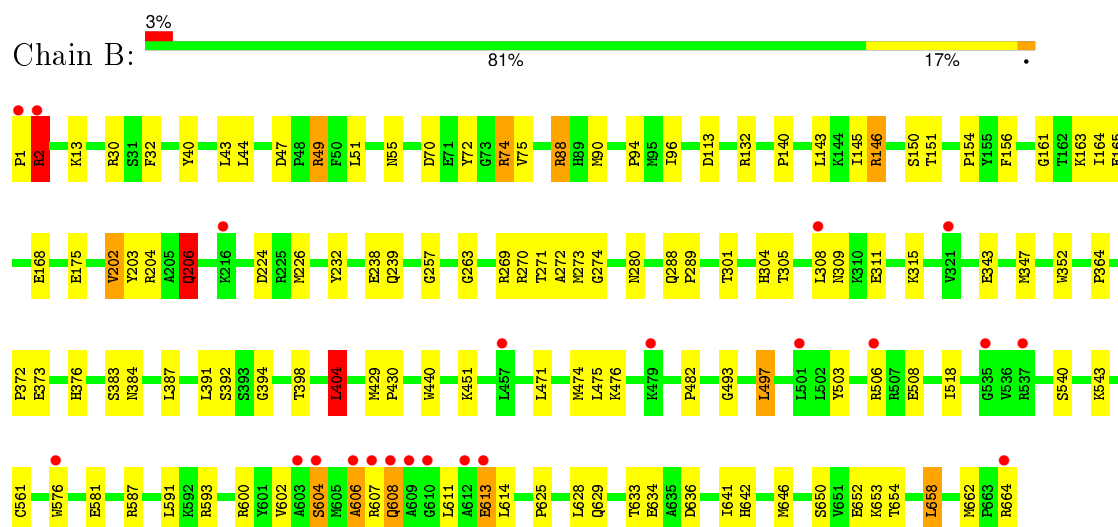These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according 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.
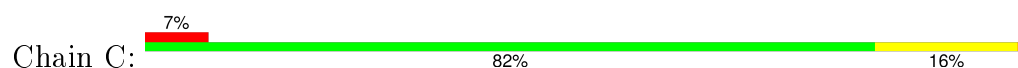
- Molecule 1: RNA-DEPENDENT RNA POLYMERASE
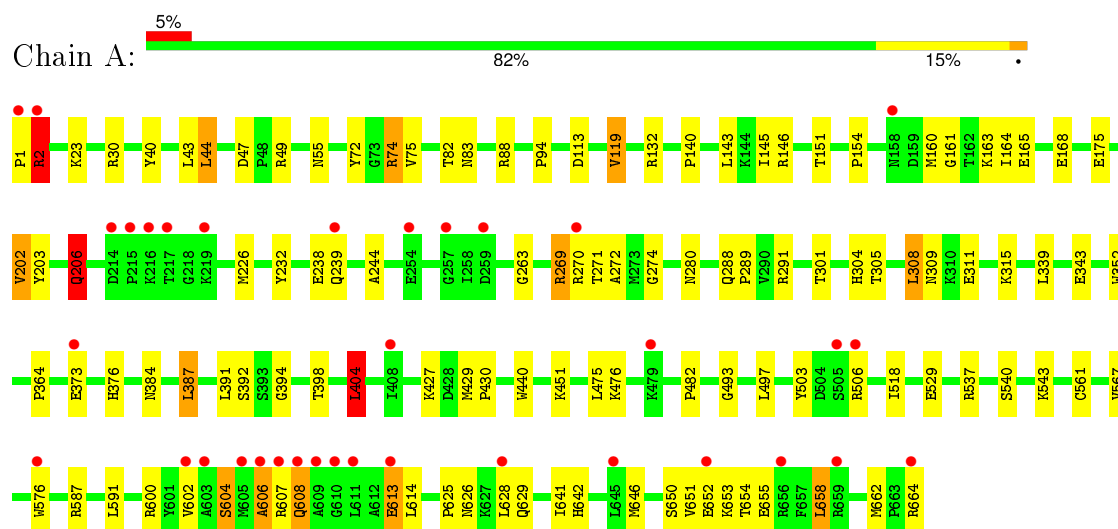
- Molecule 1: RNA-DEPENDENT RNA POLYMERASE

- Molecule 1: RNA-DEPENDENT RNA POLYMERASE

• Molecule 2: 5'-R(*UP*UP*UP*UP*CP*CP)-3'

Chain D:

• Molecule 2: 5'-R(*UP*UP*UP*UP*CP*CP)-3'

Chain E:

• Molecule 2: 5'-R(*UP*UP*UP*UP*CP*CP)-3'

Chain F:

4   Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	105.13Å 93.71Å 140.74Å 90.00° 101.22° 90.00°	Depositor
Resolution (Å)	19.93 – 2.15 19.93 – 2.15	Depositor EDS
% Data completeness (in resolution range)	97.8 (19.93-2.15) 97.9 (19.93-2.15)	Depositor EDS
R_{merge}	0.13	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.92 (at 2.15Å)	Xtriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.230 , 0.256 0.230 , 0.256	Depositor DCC
R_{free} test set	7208 reflections (5.06%)	DCC
Wilson B-factor (Å^2)	27.7	Xtriage
Anisotropy	0.631	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.39 , 43.2	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning[2]	$< |L| > = 0.50, < L^2 > = 0.33$	Xtriage
Outliers	1 of 142480 reflections (0.001%)	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	16447	wwPDB-VP
Average B, all atoms (Å^2)	33.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.28% 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, 0.375 respectively for untwinned datasets, and 0.333, 0.2 for perfectly twinned datasets.

5 Model quality ⓘ

5.1 Standard geometry ⓘ

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

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	0.52	0/5396	0.69	2/7297 (0.0%)
1	B	0.53	0/5396	0.71	4/7297 (0.1%)
1	C	0.51	0/5396	0.70	2/7297 (0.0%)
2	D	0.44	0/84	0.89	0/128
2	E	0.62	0/84	1.08	0/128
2	F	0.52	0/84	0.90	0/128
All	All	0.52	0/16440	0.71	8/22275 (0.0%)

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	C	0	1
2	D	0	1
2	E	0	1
2	F	0	1
All	All	0	4

There are no bond length outliers.

The worst 5 of 8 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	C	206	GLN	N-CA-C	-7.57	90.57	111.00
1	A	206	GLN	N-CA-C	-7.43	90.94	111.00
1	B	206	GLN	N-CA-C	-7.24	91.46	111.00
1	B	88	ARG	NE-CZ-NH2	-5.95	117.33	120.30
1	B	49	ARG	NE-CZ-NH2	-5.52	117.54	120.30

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	C	40	TYR	Sidechain
2	D	5	U	Sidechain
2	E	5	U	Sidechain
2	F	5	U	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	A	5265	0	5165	92	0
1	B	5265	0	5165	98	0
1	C	5265	0	5165	90	0
2	D	77	0	44	16	0
2	E	77	0	44	19	0
2	F	77	0	44	15	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
4	A	116	0	0	3	0
4	B	192	0	0	0	0
4	C	109	0	0	2	0
4	D	1	0	0	0	0
All	All	16447	0	15627	292	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 9.

The worst 5 of 292 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:B:274:GLY:HA2	2:E:6:U:H1'	1.33	1.11
1:C:274:GLY:HA2	2:F:6:U:H1'	1.42	1.01
1:A:274:GLY:HA2	2:D:6:U:H1'	1.44	0.98
1:A:364:PRO:HA	1:A:387:LEU:HD22	1.56	0.87

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:301:THR:HG23	1:C:440:TRP:O	1.75	0.87

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	662/664 (100%)	636 (96%)	21 (3%)	5 (1%)	24	15
1	B	662/664 (100%)	637 (96%)	20 (3%)	5 (1%)	24	15
1	C	662/664 (100%)	635 (96%)	22 (3%)	5 (1%)	24	15
All	All	1986/1992 (100%)	1908 (96%)	63 (3%)	15 (1%)	24	15

5 of 15 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	604	SER
1	A	608	GLN
1	B	604	SER
1	B	608	GLN
1	C	604	SER

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	557/557 (100%)	535 (96%)	22 (4%)	39	36
1	B	557/557 (100%)	539 (97%)	18 (3%)	46	45
1	C	557/557 (100%)	537 (96%)	20 (4%)	42	40
All	All	1671/1671 (100%)	1611 (96%)	60 (4%)	42	40

5 of 60 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	146	ARG
1	B	391	LEU
1	C	497	LEU
1	B	206	GLN
1	B	497	LEU

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

Mol	Chain	Res	Type
1	B	26	GLN
1	B	309	ASN
1	C	239	GLN
1	A	629	GLN
1	C	309	ASN

5.3.3　RNA (i)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
2	D	4/6 (66%)	2 (50%)	1 (25%)
2	E	4/6 (66%)	2 (50%)	1 (25%)
2	F	4/6 (66%)	2 (50%)	1 (25%)
All	All	12/18 (66%)	6 (50%)	3 (25%)

5 of 6 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
2	D	6	U
2	D	8	C
2	E	6	U
2	E	8	C
2	F	6	U

All (3) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
2	D	5	U
2	E	5	U
2	F	5	U

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)

Of 3 ligands modelled in this entry, 3 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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(Å²)	Q<0.9
1	A	664/664 (100%)	0.20	35 (5%)	30	40	17, 30, 52, 102	0
1	B	664/664 (100%)	0.22	22 (3%)	50	60	17, 28, 51, 102	0
1	C	664/664 (100%)	0.47	44 (6%)	22	30	18, 31, 53, 103	0
2	D	4/6 (66%)	3.16	4 (100%)	0	0	115, 116, 122, 128	0
2	E	4/6 (66%)	4.45	4 (100%)	0	0	115, 116, 123, 129	0
2	F	4/6 (66%)	3.88	4 (100%)	0	0	115, 116, 123, 129	0
All	All	2004/2010 (99%)	0.32	113 (5%)	28	38	17, 30, 53, 129	0

The worst 5 of 113 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	607	ARG	11.4
1	C	603	ALA	11.3
1	B	606	ALA	9.9
1	C	606	ALA	9.5
1	B	609	ALA	9.0

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 carbohydrates in this entry.

6.4 Ligands (i)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(Å^2)	Q<0.9
3	MN	A	1665	1/1	0.99	0.08	-1.31	29,29,29,29	0
3	MN	C	1665	1/1	0.99	0.05	-2.62	30,30,30,30	0
3	MN	B	1665	1/1	0.98	0.06	-3.53	26,26,26,26	0

6.5 Other polymers (i)

There are no such residues in this entry.