Full wwPDB X-ray Structure Validation Report (i)

May 14, 2020 – 02:36 am BST

PDB ID	:	3LQ9
Title	:	Crystal structure of human REDD1, a hypoxia-induced regulator of mTOR
Authors	:	Vega-Rubin-de-Celis, S.; Abdallah, Z.; Brugarolas, J.; Zhang, X.
Deposited on	:	2010-02-08
Resolution	:	2.00 Å(reported)

This is a Full wwPDB X-ray 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/XrayValidationReportHelp
with specific help available everywhere you see the (i) symbol.

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

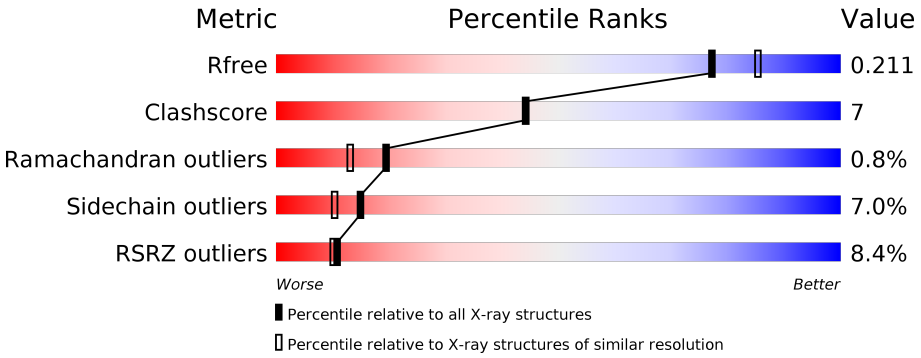
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.11
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 2.00 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	8085 (2.00-2.00)
Clashscore	141614	9178 (2.00-2.00)
Ramachandran outliers	138981	9054 (2.00-2.00)
Sidechain outliers	138945	9053 (2.00-2.00)
RSRZ outliers	127900	7900 (2.00-2.00)

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% 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	134	6% 82% 11%
1	B	134	10% 78% 13% 6%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 2124 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 DNA-damage-inducible transcript 4 protein.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	128	Total	C	N	O	S	Se	0	0	0
			970	610	175	179	4	2			
1	B	126	Total	C	N	O	S	Se	0	0	0
			951	600	170	175	4	2			

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	88	SER	-	EXPRESSION TAG	UNP Q9NX09
A	?	-	PHE	DELETION	UNP Q9NX09
A	?	-	LEU	DELETION	UNP Q9NX09
A	?	-	PRO	DELETION	UNP Q9NX09
A	?	-	GLY	DELETION	UNP Q9NX09
A	?	-	PHE	DELETION	UNP Q9NX09
B	88	SER	-	EXPRESSION TAG	UNP Q9NX09
B	?	-	PHE	DELETION	UNP Q9NX09
B	?	-	LEU	DELETION	UNP Q9NX09
B	?	-	PRO	DELETION	UNP Q9NX09
B	?	-	GLY	DELETION	UNP Q9NX09
B	?	-	PHE	DELETION	UNP Q9NX09

- Molecule 2 is water.

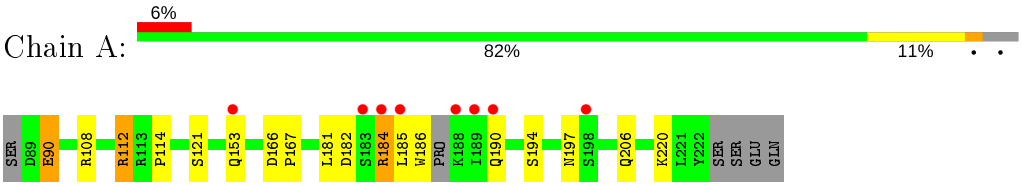
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	115	Total	O	0	0
			115	115		
2	B	88	Total	O	0	0
			88	88		

3 Residue-property plots (i)

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 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.

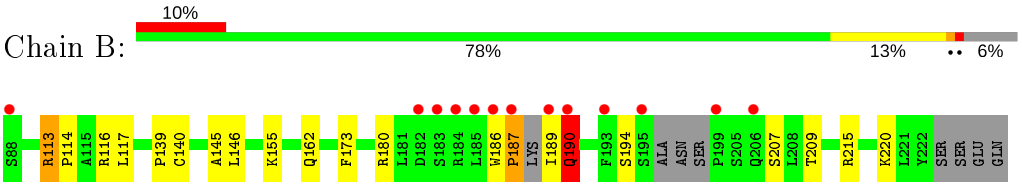
- Molecule 1: DNA-damage-inducible transcript 4 protein

Chain A:



- Molecule 1: DNA-damage-inducible transcript 4 protein

Chain B:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	33.33Å 36.59Å 47.97Å 77.56° 89.08° 86.18°	Depositor
Resolution (Å)	27.10 – 2.00 27.10 – 2.00	Depositor EDS
% Data completeness (in resolution range)	93.6 (27.10-2.00) 93.6 (27.10-2.00)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	5.37 (at 1.99Å)	Xtriage
Refinement program	PHENIX	Depositor
R, R_{free}	0.177 , 0.214 0.171 , 0.211	Depositor DCC
R_{free} test set	708 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å^2)	21.1	Xtriage
Anisotropy	0.327	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 49.1	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	2124	wwPDB-VP
Average B, all atoms (Å^2)	30.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 11.89% of the height of the origin peak. No significant pseudotranslation is detected.*

[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	A	0.24	0/979	0.43	0/1318
1	B	0.25	0/959	0.47	1/1288 (0.1%)
All	All	0.24	0/1938	0.45	1/2606 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	187	PRO	N-CA-CB	6.27	110.83	103.30

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	970	0	1008	14	0
1	B	951	0	984	12	0
2	A	115	0	0	1	0
2	B	88	0	0	0	0
All	All	2124	0	1992	26	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.

All (26) 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:A:112:ARG:HH11	1:A:112:ARG:HG3	1.45	0.81
1:A:112:ARG:HH11	1:A:112:ARG:CG	1.99	0.75
1:B:180:ARG:HH22	1:B:215:ARG:HG3	1.62	0.64
1:B:113:ARG:HD3	1:B:190:GLN:HE21	1.63	0.62
1:A:90:GLU:H	1:A:90:GLU:CD	2.05	0.60
1:A:90:GLU:HG2	2:A:34:HOH:O	2.02	0.59
1:B:146:LEU:HD21	1:B:162:GLN:HE21	1.70	0.57
1:A:182:ASP:OD1	1:A:184:ARG:HD3	2.07	0.54
1:B:155:LYS:HA	1:B:155:LYS:HE2	1.90	0.54
1:B:113:ARG:HG3	1:B:113:ARG:O	2.08	0.52
1:A:194:SER:O	1:A:197:ASN:HB2	2.11	0.51
1:B:145:ALA:HB2	1:B:173:PHE:CZ	2.49	0.47
1:A:112:ARG:HD2	1:A:112:ARG:N	2.30	0.47
1:A:108:ARG:NH2	1:A:114:PRO:HB3	2.31	0.46
1:B:139:PRO:O	1:B:140:CYS:HB2	2.15	0.45
1:B:190:GLN:H	1:B:190:GLN:HG3	1.53	0.45
1:B:187:PRO:O	1:B:189:ILE:N	2.50	0.44
1:A:112:ARG:CB	1:A:112:ARG:HH11	2.30	0.44
1:A:112:ARG:NH1	1:A:112:ARG:CG	2.68	0.43
1:A:166:ASP:HA	1:A:167:PRO:HD3	1.86	0.42
1:A:194:SER:HB2	1:A:197:ASN:ND2	2.35	0.42
1:B:116:ARG:HD2	1:B:207:SER:OG	2.20	0.41
1:B:113:ARG:HD3	1:B:190:GLN:NE2	2.31	0.41
1:A:112:ARG:NH1	1:A:112:ARG:CB	2.84	0.40
1:A:185:LEU:O	1:A:186:TRP:C	2.59	0.40
1:B:113:ARG:HA	1:B:114:PRO:HD3	1.82	0.40

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	124/134 (92%)	121 (98%)	3 (2%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	B	120/134 (90%)	115 (96%)	3 (2%)	2 (2%)	9 4
All	All	244/268 (91%)	236 (97%)	6 (2%)	2 (1%)	19 13

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	186	TRP
1	B	190	GLN

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	109/116 (94%)	100 (92%)	9 (8%)	11 7
1	B	106/116 (91%)	100 (94%)	6 (6%)	20 16
All	All	215/232 (93%)	200 (93%)	15 (7%)	15 10

All (15) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	90	GLU
1	A	112	ARG
1	A	121	SER
1	A	153	GLN
1	A	181	LEU
1	A	184	ARG
1	A	190	GLN
1	A	206	GLN
1	A	220	LYS
1	B	113	ARG
1	B	117	LEU
1	B	190	GLN
1	B	194	SER
1	B	209	THR

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Mol	Chain	Res	Type
1	B	220	LYS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	98	GLN
1	A	122	GLN
1	A	126	GLN
1	A	158	HIS
1	A	206	GLN
1	B	98	GLN
1	B	101	GLN
1	B	162	GLN
1	B	190	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 carbohydrates 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.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

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, 95^{th} 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	126/134 (94%)	0.04	8 (6%) 20 19	14, 25, 58, 71	0
1	B	124/134 (92%)	0.30	13 (10%) 6 5	15, 25, 64, 84	0
All	All	250/268 (93%)	0.17	21 (8%) 11 10	14, 25, 60, 84	0

All (21) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	187	PRO	7.4
1	B	186	TRP	6.7
1	B	183	SER	6.3
1	B	193	PHE	5.9
1	B	184	ARG	5.8
1	B	185	LEU	5.0
1	B	88	SER	3.7
1	B	189	ILE	3.0
1	A	153	GLN	3.0
1	A	188	LYS	3.0
1	B	195	SER	2.9
1	A	185	LEU	2.8
1	B	199	PRO	2.6
1	B	190	GLN	2.6
1	A	183	SER	2.6
1	B	206	GLN	2.6
1	A	189	ILE	2.3
1	A	198	SER	2.2
1	A	184	ARG	2.1
1	A	190	GLN	2.1
1	B	182	ASP	2.0

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)

There are no ligands in this entry.

6.5 Other polymers (i)

There are no such residues in this entry.