



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 29, 2024 – 06:29 PM EDT

PDB ID : 4L3I  
Title : Structure of the microtubule associated protein PRC1 (Protein Regulator of Cytokinesis 1)  
Authors : Subramanian, R.; Ti, S.; Tan, L.; Darst, S.A.; Kapoor, T.M.  
Deposited on : 2013-06-06  
Resolution : 3.60 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](mailto: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 ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity : 4.02b-467  
Mogul : 2022.3.0, CSD as543be (2022)  
Xtrriage (Phenix) : 1.20.1  
EDS : 3.0  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
CCP4 : 9.0.003 (Gargrove)  
Density-Fitness : 1.0.11  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.39

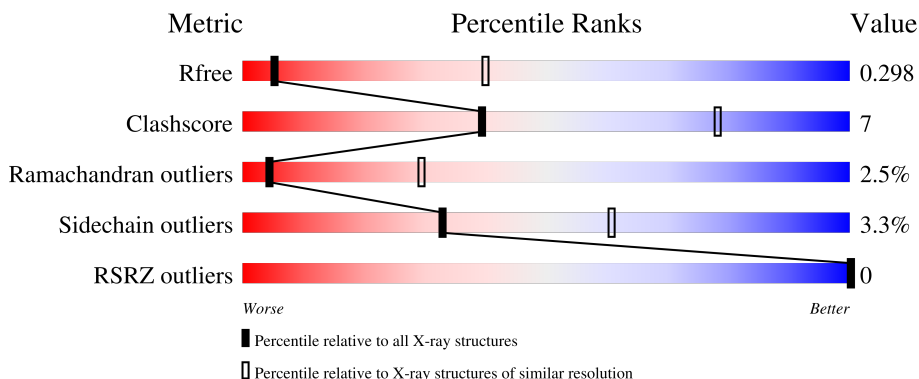
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.60 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))
$R_{free}$	164625	1563 (3.70-3.50)
Clashscore	180529	1665 (3.70-3.50)
Ramachandran outliers	177936	1641 (3.70-3.50)
Sidechain outliers	177891	1640 (3.70-3.50)
RSRZ outliers	164620	1562 (3.70-3.50)

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  $\geq 3$ , 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  $\leq 5\%$ . 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	490	 76% 15% 8%
1	B	490	 74% 15% 10%

## 2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 6446 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 Protein regulator of cytokinesis 1.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	S	Se			
1	A	449	3225	2040	570	593	9	13	0	0	0
1	B	443	3221	2036	563	599	10	13	0	0	0


There are 10 discrepancies between the modelled and reference sequences:

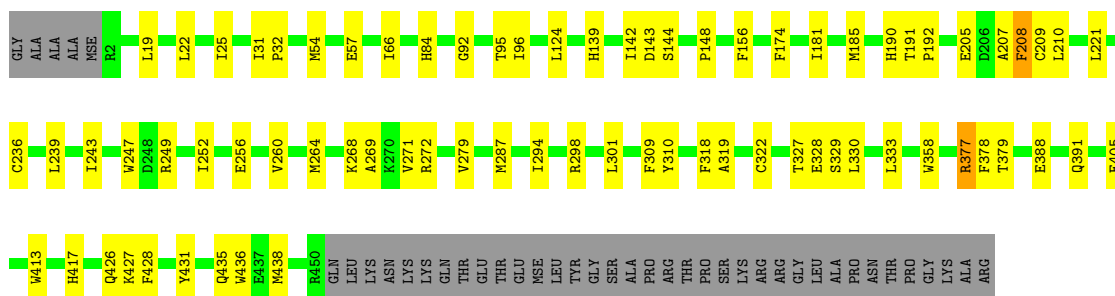
Chain	Residue	Modelled	Actual	Comment	Reference
A	-3	GLY	-	expression tag	UNP O43663
A	-2	ALA	-	expression tag	UNP O43663
A	-1	ALA	-	expression tag	UNP O43663
A	0	ALA	-	expression tag	UNP O43663
A	187	GLU	ALA	variant	UNP O43663
B	-3	GLY	-	expression tag	UNP O43663
B	-2	ALA	-	expression tag	UNP O43663
B	-1	ALA	-	expression tag	UNP O43663
B	0	ALA	-	expression tag	UNP O43663
B	187	GLU	ALA	variant	UNP O43663

### 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 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.

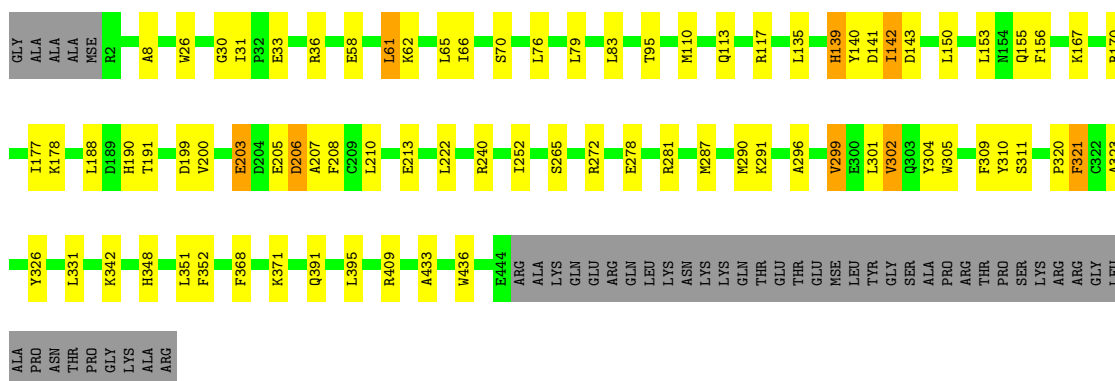
- Molecule 1: Protein regulator of cytokinesis 1

Chain A: 



- Molecule 1: Protein regulator of cytokinesis 1

Chain B: 



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	61.20Å 210.78Å 112.29Å 90.00° 105.81° 90.00°	Depositor
Resolution (Å)	29.73 – 3.60 29.73 – 3.60	Depositor EDS
% Data completeness (in resolution range)	96.2 (29.73-3.60) 92.4 (29.73-3.60)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.06 (at 3.55Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.7.3_928)	Depositor
R, $R_{free}$	0.257 , 0.300 0.268 , 0.298	Depositor DCC
$R_{free}$ test set	1878 reflections (6.43%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	108.3	Xtriage
Anisotropy	0.884	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.23 , 207.6	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.408 for h,-k,-h-l	Xtriage
Reported twinning fraction	0.493 for h,-k,-h-l	Depositor
Outliers	0 of 31794 reflections	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	6446	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	137.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.85% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  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	0.43	1/3262 (0.0%)	0.41	0/4423
1	B	0.42	0/3258	0.43	0/4416
All	All	0.43	1/6520 (0.0%)	0.42	0/8839

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	405	GLU	CD-OE2	6.89	1.33	1.25

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	3225	0	2784	34	0
1	B	3221	0	2824	47	0
All	All	6446	0	5608	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 7.

All (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)
1:A:309:PHE:HB3	1:A:310:TYR:HA	1.56	0.87
1:B:178:LYS:NZ	1:B:200:VAL:O	2.24	0.71
1:A:327:THR:O	1:A:329:SER:N	2.25	0.68
1:A:309:PHE:HB3	1:A:310:TYR:CA	2.26	0.65
1:B:31:ILE:HB	1:B:36:ARG:HE	1.61	0.64
1:B:110:MSE:SE	1:B:113:GLN:HE21	2.31	0.63
1:A:185:MSE:HE3	1:A:190:HIS:HD2	1.64	0.63
1:A:66:ILE:HD11	1:A:96:ILE:HD13	1.79	0.62
1:B:433:ALA:HA	1:B:436:TRP:HD1	1.64	0.62
1:B:351:LEU:HD23	1:B:409:ARG:HD3	1.82	0.61
1:B:301:LEU:O	1:B:305:TRP:N	2.34	0.60
1:B:199:ASP:OD1	1:B:200:VAL:N	2.35	0.59
1:A:142:ILE:HB	1:A:144:SER:H	1.68	0.59
1:B:110:MSE:SE	1:B:113:GLN:NE2	2.85	0.59
1:A:377:ARG:O	1:A:379:THR:N	2.34	0.58
1:B:135:LEU:HD22	1:B:170:ARG:HD2	1.87	0.57
1:A:19:LEU:HD13	1:B:8:ALA:HB1	1.87	0.57
1:B:140:TYR:HD1	1:B:142:ILE:HG12	1.68	0.57
1:A:22:LEU:HD23	1:A:25:ILE:HD11	1.88	0.56
1:A:269:ALA:HB3	1:A:271:VAL:HG23	1.87	0.56
1:B:290:MSE:HE2	1:B:331:LEU:HD22	1.89	0.55
1:B:142:ILE:HG13	1:B:143:ASP:HA	1.89	0.55
1:A:435:GLN:HA	1:A:438:MSE:HG2	1.90	0.54
1:A:174:PHE:HE2	1:A:205:GLU:HG2	1.74	0.53
1:A:54:MSE:HA	1:A:57:GLU:HG3	1.91	0.52
1:A:247:TRP:HB3	1:A:252:ILE:HB	1.91	0.52
1:B:348:HIS:HA	1:B:351:LEU:HD12	1.91	0.52
1:B:368:PHE:HA	1:B:371:LYS:HG2	1.91	0.51
1:B:79:LEU:HD13	1:B:110:MSE:HB2	1.93	0.51
1:B:170:ARG:NH1	1:B:210:LEU:O	2.44	0.51
1:B:135:LEU:HD11	1:B:167:LYS:HB2	1.94	0.50
1:B:177:ILE:HG23	1:B:222:LEU:HD22	1.92	0.50
1:B:240:ARG:NH2	1:B:265:SER:O	2.45	0.49
1:A:124:LEU:HB3	1:A:156:PHE:CE2	2.47	0.49
1:B:304:TYR:CZ	1:B:342:LYS:HG2	2.47	0.49
1:B:291:LYS:HA	1:B:326:TYR:CD1	2.49	0.48
1:A:298:ARG:HA	1:A:301:LEU:HD12	1.95	0.48
1:A:294:ILE:HD13	1:A:330:LEU:HD23	1.96	0.48
1:A:239:LEU:HD22	1:A:279:VAL:HG21	1.96	0.47
1:B:302:VAL:HA	1:B:305:TRP:HB2	1.95	0.47
1:B:142:ILE:HB	1:B:143:ASP:C	2.34	0.47
1:B:203:GLU:CD	1:B:207:ALA:HB3	2.35	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:207:ALA:HB1	1:B:208:PHE:HA	1.95	0.47
1:B:62:LYS:O	1:B:66:ILE:HG13	2.15	0.47
1:A:426:GLN:HA	1:A:427:LYS:HA	1.72	0.46
1:A:181:ILE:HD13	1:A:221:LEU:HD22	1.98	0.46
1:B:309:PHE:HB3	1:B:310:TYR:HB3	1.98	0.45
1:A:358:TRP:HZ2	1:A:436:TRP:HE1	1.65	0.45
1:B:188:LEU:HD11	1:B:190:HIS:HB2	1.98	0.45
1:B:310:TYR:HD1	1:B:311:SER:O	1.97	0.45
1:B:305:TRP:O	1:B:310:TYR:HD2	1.99	0.45
1:A:236:CYS:SG	1:A:272:ARG:HG2	2.57	0.44
1:A:243:ILE:HB	1:A:264:MSE:HE1	1.98	0.44
1:A:95:THR:HG23	1:B:30:GLY:HA3	2.00	0.44
1:B:26:TRP:O	1:B:36:ARG:NH2	2.49	0.44
1:B:206:ASP:N	1:B:206:ASP:OD1	2.51	0.44
1:A:208:PHE:HB2	1:A:209:CYS:H	1.58	0.44
1:B:296:ALA:O	1:B:299:VAL:HG12	2.18	0.43
1:A:413:TRP:O	1:A:417:HIS:N	2.51	0.43
1:A:309:PHE:CB	1:A:310:TYR:HA	2.36	0.43
1:B:391:GLN:O	1:B:395:LEU:HG	2.19	0.43
1:B:199:ASP:HB2	1:B:203:GLU:OE1	2.19	0.43
1:A:256:GLU:O	1:A:260:VAL:HG23	2.19	0.42
1:A:142:ILE:HB	1:A:143:ASP:HA	2.02	0.42
1:B:150:LEU:HD23	1:B:153:LEU:HD12	2.01	0.42
1:B:83:LEU:HD22	1:B:117:ARG:HH11	1.85	0.42
1:A:31:ILE:HA	1:A:32:PRO:HD3	1.89	0.41
1:A:139:HIS:O	1:A:139:HIS:ND1	2.48	0.41
1:B:348:HIS:HB2	1:B:352:PHE:CE2	2.54	0.41
1:B:33:GLU:HA	1:B:36:ARG:HD2	2.01	0.41
1:B:58:GLU:HA	1:B:61:LEU:HD23	2.01	0.41
1:B:205:GLU:HA	1:B:206:ASP:HA	1.86	0.41
1:B:287:MSE:HE2	1:B:326:TYR:HD2	1.85	0.41
1:A:207:ALA:HA	1:A:208:PHE:HA	1.85	0.40
1:A:431:TYR:O	1:A:435:GLN:HG2	2.21	0.40
1:B:301:LEU:HB3	1:B:305:TRP:NE1	2.35	0.40
1:A:388:GLU:HA	1:A:391:GLN:HE21	1.87	0.40
1:B:139:HIS:O	1:B:139:HIS:ND1	2.47	0.40
1:B:278:GLU:OE2	1:B:281:ARG:NH2	2.50	0.40

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 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	447/490 (91%)	401 (90%)	33 (7%)	13 (3%)	3	27
1	B	441/490 (90%)	400 (91%)	32 (7%)	9 (2%)	6	34
All	All	888/980 (91%)	801 (90%)	65 (7%)	22 (2%)	4	29

All (22) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	319	ALA
1	A	328	GLU
1	B	141	ASP
1	B	321	PHE
1	A	191	THR
1	A	268	LYS
1	A	378	PHE
1	B	95	THR
1	B	323	ALA
1	A	148	PRO
1	A	210	LEU
1	A	428	PHE
1	B	191	THR
1	A	84	HIS
1	A	92	GLY
1	A	192	PRO
1	A	322	CYS
1	A	377	ARG
1	B	213	GLU
1	B	252	ILE
1	B	142	ILE
1	B	320	PRO

### 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 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	267/434 (62%)	262 (98%)	5 (2%)	52	73
1	B	279/434 (64%)	266 (95%)	13 (5%)	22	51
All	All	546/868 (63%)	528 (97%)	18 (3%)	33	61

All (18) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	208	PHE
1	A	249	ARG
1	A	287	MSE
1	A	318	PHE
1	A	333	LEU
1	B	61	LEU
1	B	65	LEU
1	B	70	SER
1	B	76	LEU
1	B	139	HIS
1	B	155	GLN
1	B	156	PHE
1	B	203	GLU
1	B	206	ASP
1	B	272	ARG
1	B	299	VAL
1	B	302	VAL
1	B	321	PHE

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

Mol	Chain	Res	Type
1	A	190	HIS
1	B	106	GLN
1	B	113	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 oligosaccharides 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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	436/490 (88%)	-0.94	0 <a href="#">100</a> <a href="#">100</a>	72, 134, 186, 220	0
1	B	430/490 (87%)	-0.97	0 <a href="#">100</a> <a href="#">100</a>	76, 134, 195, 250	0
All	All	866/980 (88%)	-0.96	0 <a href="#">100</a> <a href="#">100</a>	72, 134, 188, 250	0

There are no RSRZ outliers to report.

### 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.