



# Full wwPDB X-ray Structure Validation Report ⓘ

Nov 21, 2023 – 12:54 AM JST

PDB ID : 7E9M  
Title : Crystal Structure of Spindlin1 bound to SPINDOC Docpep3  
Authors : Zhao, F.; Li, H.  
Deposited on : 2021-03-04  
Resolution : 2.50 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  
Xtriage (Phenix) : 1.13  
EDS : 2.36  
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) : 2.36

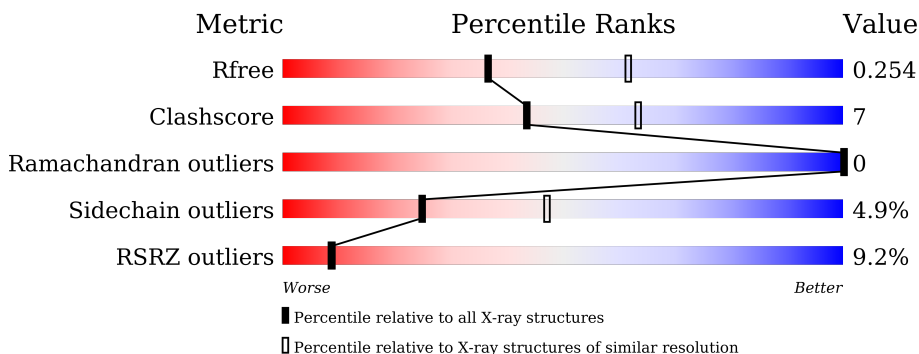
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.50 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	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (2.50-2.50)

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	262	 6% (red), 66% (green), 9% (yellow), 24% (grey)
1	C	262	 9% (red), 60% (green), 14% (yellow), 25% (grey)
2	B	27	 81% (green), 11% (yellow), 8% (orange), 0% (red), 0% (grey)
2	D	27	 81% (green), 11% (yellow), 8% (orange), 0% (red), 0% (grey)

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 3686 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 Spindlin-1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	199	Total 1603	C 1025	N 262	O 307	S 9	0	0	0
1	C	197	Total 1584	C 1015	N 257	O 303	S 9	0	0	0

- Molecule 2 is a protein called Peptide from Spindlin interactor and repressor of chromatin-binding protein.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	B	26	Total 203	C 135	N 34	O 34	0	0	0
2	D	26	Total 203	C 135	N 34	O 34	0	0	0

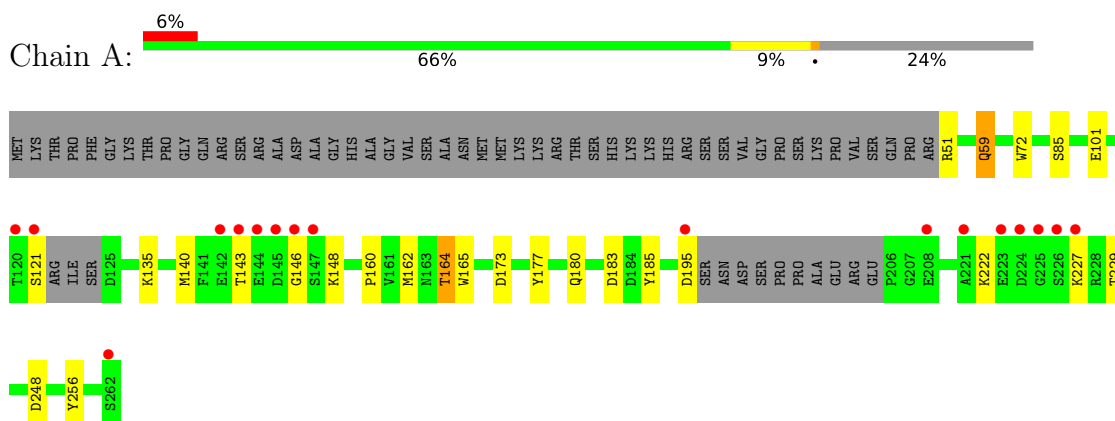
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	42	Total 42	O 42	0	0
3	B	2	Total 2	O 2	0	0
3	C	42	Total 42	O 42	0	0
3	D	7	Total 7	O 7	0	0

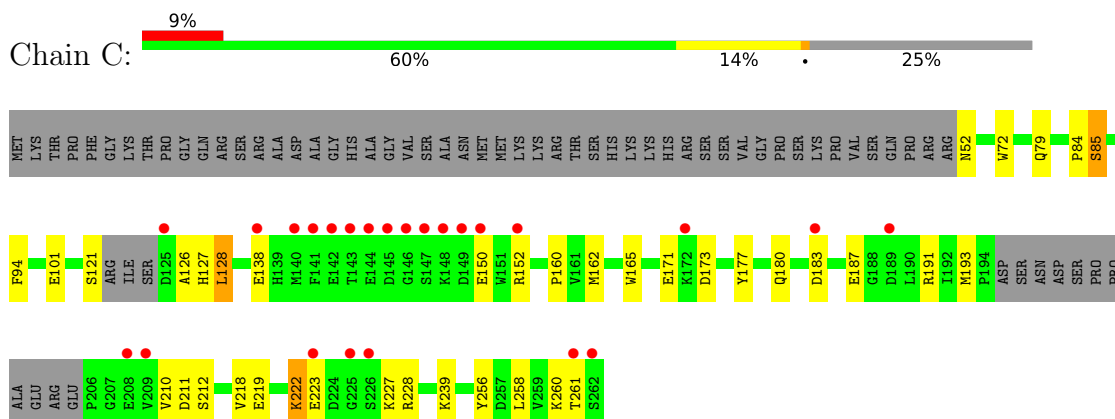
### 3 Residue-property plots [i](#)

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.

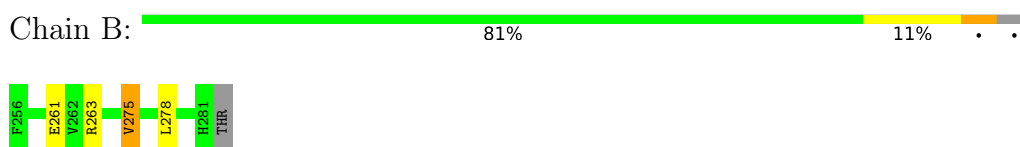
- Molecule 1: Spindlin-1



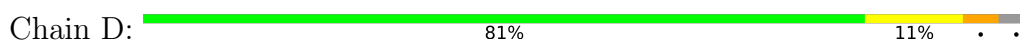
- Molecule 1: Spindlin-1



- Molecule 2: Peptide from Spindlin interactor and repressor of chromatin-binding protein



- Molecule 2: Peptide from Spindlin interactor and repressor of chromatin-binding protein





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	77.61Å 45.54Å 85.98Å 90.00° 93.09° 90.00°	Depositor
Resolution (Å)	38.75 – 2.50 40.23 – 2.50	Depositor EDS
% Data completeness (in resolution range)	98.8 (38.75-2.50) 99.1 (40.23-2.50)	Depositor EDS
$R_{merge}$	0.11	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.53 (at 2.51Å)	Xtrriage
Refinement program	PHENIX 1.17.1_3660	Depositor
R, $R_{free}$	0.204 , 0.253 0.206 , 0.254	Depositor DCC
$R_{free}$ test set	1020 reflections (4.87%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	34.0	Xtrriage
Anisotropy	0.315	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.37 , 52.9	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.91	EDS
Total number of atoms	3686	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	43.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.42% 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	0.47	0/1640	0.63	0/2220
1	C	0.48	0/1621	0.66	0/2195
2	B	0.44	0/211	0.59	0/286
2	D	0.45	0/211	0.54	0/286
All	All	0.47	0/3683	0.64	0/4987

There are no bond length outliers.

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	1603	0	1554	21	0
1	C	1584	0	1537	30	0
2	B	203	0	186	3	0
2	D	203	0	186	3	0
3	A	42	0	0	1	0
3	B	2	0	0	0	0
3	C	42	0	0	4	0
3	D	7	0	0	0	0
All	All	3686	0	3463	47	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 (47) 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:185:TYR:OH	1:C:126:ALA:HB1	1.58	1.02
1:C:222:LYS:HD3	1:C:228:ARG:HD2	1.69	0.75
1:C:126:ALA:HB2	3:C:329:HOH:O	1.87	0.74
1:A:185:TYR:CE1	1:C:126:ALA:CB	2.73	0.71
1:A:185:TYR:HE1	1:C:126:ALA:HB2	1.54	0.71
1:A:185:TYR:OH	1:C:126:ALA:CB	2.40	0.69
1:A:185:TYR:CZ	1:C:126:ALA:HB1	2.28	0.68
1:A:185:TYR:CE1	1:C:126:ALA:HB2	2.28	0.68
2:B:263:ARG:HB3	2:B:275:VAL:HG23	1.79	0.64
1:C:260:LYS:HD3	1:C:261:THR:N	2.13	0.63
1:C:150:GLU:OE2	1:C:191:ARG:NH2	2.34	0.60
2:D:263:ARG:HB3	2:D:275:VAL:HG23	1.84	0.59
1:C:180:GLN:OE1	3:C:301:HOH:O	2.17	0.58
1:A:160:PRO:O	1:A:162:MET:N	2.34	0.58
1:A:185:TYR:CZ	1:C:126:ALA:CB	2.87	0.57
1:A:140:MET:SD	1:A:148:LYS:HB3	2.44	0.57
1:A:185:TYR:HH	1:C:126:ALA:HB1	1.66	0.57
1:A:162:MET:HB3	1:A:165:TRP:CD1	2.41	0.56
1:A:164:THR:HB	1:A:180:GLN:HE21	1.72	0.55
1:A:173:ASP:OD2	1:A:177:TYR:OH	2.26	0.53
1:C:79:GLN:NE2	1:C:84:PRO:O	2.43	0.52
2:D:261:GLU:OE2	2:D:263:ARG:NH2	2.44	0.51
1:A:51:ARG:NH1	3:A:303:HOH:O	2.33	0.50
1:C:85:SER:O	1:C:101:GLU:HA	2.12	0.50
1:A:229:THR:OG1	1:A:248:ASP:OD2	2.27	0.50
1:A:143:THR:O	1:A:146:GLY:N	2.38	0.50
1:C:227:LYS:NZ	3:C:309:HOH:O	2.46	0.48
1:C:72:TRP:CH2	1:C:94:PHE:HE2	2.33	0.47
1:A:85:SER:O	1:A:101:GLU:HA	2.16	0.46
1:C:210:VAL:HG12	1:C:211:ASP:O	2.17	0.45
1:C:256:TYR:CZ	2:D:278:LEU:HD13	2.52	0.45
1:C:173:ASP:OD2	1:C:177:TYR:OH	2.33	0.44
1:A:59:GLN:HA	1:A:72:TRP:O	2.18	0.44
1:C:162:MET:HB3	1:C:165:TRP:CD1	2.53	0.43
1:A:195:ASP:OD1	1:A:195:ASP:N	2.51	0.43
1:C:94:PHE:N	1:C:94:PHE:CD1	2.86	0.43
1:C:52:ASN:N	3:C:310:HOH:O	2.52	0.43
1:C:219:GLU:HG2	1:C:227:LYS:HD2	2.01	0.43
1:C:239:LYS:HB3	1:C:239:LYS:NZ	2.34	0.42
1:C:138:GLU:OE1	1:C:150:GLU:HG2	2.18	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:160:PRO:O	1:C:162:MET:N	2.50	0.42
2:B:261:GLU:OE1	2:B:263:ARG:NH2	2.54	0.41
1:A:256:TYR:CZ	2:B:278:LEU:HD13	2.56	0.41
1:C:152:ARG:NH1	1:C:171:GLU:OE1	2.53	0.41
1:C:128:LEU:HD23	1:C:128:LEU:HA	1.76	0.40
1:C:152:ARG:HE	1:C:193:MET:HE1	1.86	0.40
1:A:135:LYS:HE3	1:A:195:ASP:OD1	2.20	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	193/262 (74%)	187 (97%)	6 (3%)	0	100	100
1	C	191/262 (73%)	184 (96%)	7 (4%)	0	100	100
2	B	24/27 (89%)	23 (96%)	1 (4%)	0	100	100
2	D	24/27 (89%)	23 (96%)	1 (4%)	0	100	100
All	All	432/578 (75%)	417 (96%)	15 (4%)	0	100	100

There are no Ramachandran outliers to report.

### 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	175/228 (77%)	169 (97%)	6 (3%)	37	63
1	C	173/228 (76%)	162 (94%)	11 (6%)	17	33
2	B	20/21 (95%)	19 (95%)	1 (5%)	24	46
2	D	20/21 (95%)	19 (95%)	1 (5%)	24	46
All	All	388/498 (78%)	369 (95%)	19 (5%)	25	47

All (19) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	59	GLN
1	A	121	SER
1	A	164	THR
1	A	183	ASP
1	A	222	LYS
1	A	227	LYS
2	B	275	VAL
1	C	85	SER
1	C	121	SER
1	C	127	HIS
1	C	128	LEU
1	C	183	ASP
1	C	187	GLU
1	C	212	SER
1	C	218	VAL
1	C	222	LYS
1	C	223	GLU
1	C	258	LEU
2	D	275	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	180	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 monosaccharides 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	199/262 (75%)	0.56	17 (8%) 10 10	24, 38, 72, 96	0
1	C	197/262 (75%)	0.75	24 (12%) 4 3	23, 38, 82, 121	0
2	B	26/27 (96%)	0.19	0 100 100	31, 37, 45, 59	0
2	D	26/27 (96%)	0.20	0 100 100	30, 35, 47, 58	0
All	All	448/578 (77%)	0.60	41 (9%) 9 9	23, 38, 73, 121	0

All (41) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	143	THR	8.7
1	C	148	LYS	7.8
1	C	144	GLU	7.6
1	C	145	ASP	6.7
1	C	142	GLU	5.9
1	C	147	SER	5.3
1	C	149	ASP	5.2
1	A	145	ASP	5.2
1	A	121	SER	5.1
1	C	262	SER	5.1
1	A	223	GLU	5.1
1	A	224	ASP	4.7
1	C	146	GLY	4.6
1	C	140	MET	4.3
1	A	227	LYS	3.6
1	A	142	GLU	3.5
1	C	141	PHE	3.3
1	A	144	GLU	3.3
1	C	208	GLU	3.3
1	A	226	SER	3.3
1	C	223	GLU	3.2

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Mol	Chain	Res	Type	RSRZ
1	A	262	SER	3.2
1	C	150	GLU	3.1
1	A	225	GLY	2.9
1	C	172	LYS	2.8
1	A	147	SER	2.7
1	C	138	GLU	2.6
1	A	143	THR	2.6
1	A	195	ASP	2.5
1	C	183	ASP	2.5
1	A	146	GLY	2.5
1	C	261	THR	2.5
1	C	152	ARG	2.4
1	A	208	GLU	2.3
1	C	225	GLY	2.3
1	C	189	ASP	2.2
1	C	125	ASP	2.2
1	C	209	VAL	2.1
1	A	120	THR	2.1
1	C	226	SER	2.0
1	A	221	ALA	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 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.