



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 9, 2026 – 01:04 PM UTC

PDB ID : 3VZA / pdb_00003vza
Title : Crystal structure of the chicken Spc24-Spc25 globular domain in complex with CENP-T peptide
Authors : Nishino, T.; Fukagawa, T.
Deposited on : 2012-10-09
Resolution : 1.90 Å(reported)

This is a wwPDB X-ray Structure 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/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>.

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

MolProbity	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

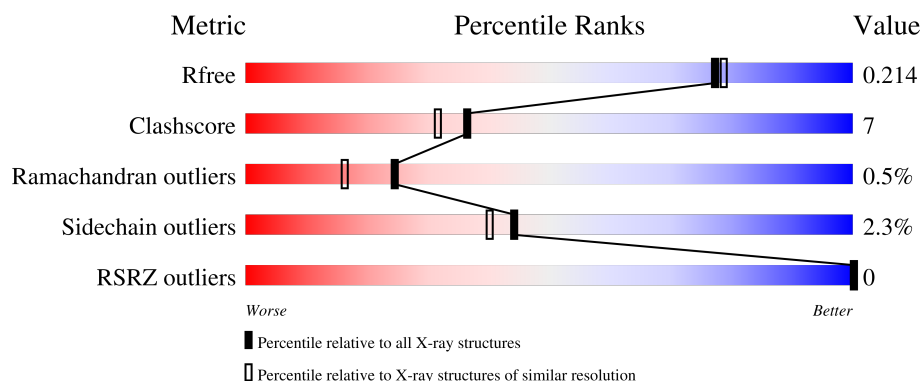
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.90 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}	180053	7789 (1.90-1.90)
Clashscore	190562	8410 (1.90-1.90)
Ramachandran outliers	187476	8333 (1.90-1.90)
Sidechain outliers	187428	8333 (1.90-1.90)
RSRZ outliers	180081	7790 (1.90-1.90)

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 ≥ 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	105	
1	B	105	
2	C	73	
2	D	73	
3	E	39	

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Mol	Chain	Length	Quality of chain
3	F	39	 A horizontal bar chart showing the quality of chain F. The bar is divided into three segments: a green segment representing 64%, a yellow segment representing 13%, and a grey segment representing 21%. A small black dot is located on the yellow segment.

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 3532 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 Uncharacterized protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	B	99	Total	C	N	O	S	0	0	0
			829	527	146	152	4			
1	A	98	Total	C	N	O	S	0	0	0
			820	522	144	150	4			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	130	GLY	-	expression tag	UNP E1C4Y2
B	131	TYR	-	expression tag	UNP E1C4Y2
A	130	GLY	-	expression tag	UNP E1C4Y2
A	131	TYR	-	expression tag	UNP E1C4Y2

- Molecule 2 is a protein called Spc24 protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	D	62	Total	C	N	O	S	0	0	0
			516	336	85	93	2			
2	C	62	Total	C	N	O	S	0	0	0
			516	336	85	93	2			

- Molecule 3 is a protein called Centromere protein T.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	E	31	Total	C	N	O	S	0	0	0
			247	153	46	47	1			
3	F	31	Total	C	N	O	S	0	0	0
			247	153	46	47	1			

There are 14 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
E	61	GLY	-	expression tag	UNP F1NPG5
E	62	ARG	-	expression tag	UNP F1NPG5
E	70	SER	ASN	conflict	UNP F1NPG5
E	72	ASP	THR	engineered mutation	UNP F1NPG5
E	79	ARG	LYS	conflict	UNP F1NPG5
E	88	ASP	SER	engineered mutation	UNP F1NPG5
E	99	PRO	-	expression tag	UNP F1NPG5
F	61	GLY	-	expression tag	UNP F1NPG5
F	62	ARG	-	expression tag	UNP F1NPG5
F	70	SER	ASN	conflict	UNP F1NPG5
F	72	ASP	THR	engineered mutation	UNP F1NPG5
F	79	ARG	LYS	conflict	UNP F1NPG5
F	88	ASP	SER	engineered mutation	UNP F1NPG5
F	99	PRO	-	expression tag	UNP F1NPG5

- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	B	89	Total O 89 89	0	0
4	D	53	Total O 53 53	0	0
4	A	92	Total O 92 92	0	0
4	C	65	Total O 65 65	0	0
4	E	27	Total O 27 27	0	0
4	F	31	Total O 31 31	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: Uncharacterized protein

Chain B:  83% 10% • 6%



- Molecule 1: Uncharacterized protein

Chain A:  80% 12% • 7%



- Molecule 2: Spc24 protein

Chain D:  71% 14% 15%



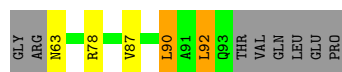
- Molecule 2: Spc24 protein

Chain C:  70% 12% •• 15%



- Molecule 3: Centromere protein T

Chain E:  67% 8% 5% 21%



- Molecule 3: Centromere protein T

Chain F:  64% 13% • 21%

GLY	ARG	N63	D69	I81	Q84	V87	L90	A91	L92	Q93	THR	VAL	GLN	LEU	GLU	PRO
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4 Data and refinement statistics

Property	Value	Source
Space group	P 31	Depositor
Cell constants a, b, c, α , β , γ	61.32Å 61.32Å 111.28Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	30.41 – 1.90 30.41 – 1.90	Depositor EDS
% Data completeness (in resolution range)	99.9 (30.41-1.90) 97.0 (30.41-1.90)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.06	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.50 (at 1.89Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.7.1_743)	Depositor
R, R_{free}	0.167 , 0.216 0.165 , 0.214	Depositor DCC
R_{free} test set	1995 reflections (2.70%)	wwPDB-VP
Wilson B-factor (Å ²)	25.1	Xtriage
Anisotropy	0.150	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 41.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.028 for -h,-k,l 0.487 for h,-h-k,-l 0.028 for -k,-h,-l	Xtriage
F_o, F_c correlation	0.98	EDS
Total number of atoms	3532	wwPDB-VP
Average B, all atoms (Å ²)	35.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.43% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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

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	1.17	2/837 (0.2%)	1.12	0/1124
1	B	1.21	3/846 (0.4%)	1.11	0/1136
2	C	1.15	1/535 (0.2%)	1.25	2/732 (0.3%)
2	D	1.10	0/535	1.23	2/732 (0.3%)
3	E	1.50	1/250 (0.4%)	1.49	1/339 (0.3%)
3	F	1.45	2/250 (0.8%)	1.48	1/339 (0.3%)
All	All	1.22	9/3253 (0.3%)	1.22	6/4402 (0.1%)

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
2	C	0	1

The worst 5 of 9 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	158	ASN	CG-OD1	-6.72	1.10	1.23
1	A	158	ASN	CG-ND2	-6.46	1.19	1.33
2	C	191	VAL	N-CA	6.20	1.51	1.46
3	F	87	VAL	CA-CB	5.93	1.63	1.54
3	F	81	ILE	CA-C	5.91	1.60	1.52

The worst 5 of 6 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	167	ILE	N-CA-C	8.36	121.66	109.63
2	C	166	ASP	N-CA-C	-7.07	95.74	110.80
2	D	167	ILE	N-CA-C	5.69	116.95	109.21
2	D	165	PRO	N-CA-C	-5.69	101.28	110.55
3	F	69	ASP	N-CA-C	5.68	117.47	111.28

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	C	165	PRO	Mainchain

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	820	0	813	10	0
1	B	829	0	821	10	1
2	C	516	0	486	10	0
2	D	516	0	486	9	0
3	E	247	0	248	5	0
3	F	247	0	248	5	0
4	A	92	0	0	3	0
4	B	89	0	0	4	0
4	C	65	0	0	3	1
4	D	53	0	0	5	0
4	E	27	0	0	1	0
4	F	31	0	0	1	0
All	All	3532	0	3102	45	1

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 45 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)
3:E:63:ASN:ND2	4:E:108:HOH:O	1.64	1.09
1:B:232:GLN:HA	4:B:363:HOH:O	1.76	0.84
1:A:200:CYS:SG	4:A:334:HOH:O	2.35	0.83
2:C:177:HIS:HE1	4:C:250:HOH:O	1.74	0.70
2:D:194:ALA:CB	4:D:250:HOH:O	2.38	0.70

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:232:GLN:O	4:C:255:HOH:O[2_565]	1.98	0.22

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	96/105 (91%)	95 (99%)	1 (1%)	0	100	100
1	B	97/105 (92%)	96 (99%)	1 (1%)	0	100	100
2	C	60/73 (82%)	57 (95%)	2 (3%)	1 (2%)	7	2
2	D	60/73 (82%)	58 (97%)	1 (2%)	1 (2%)	7	2
3	E	29/39 (74%)	29 (100%)	0	0	100	100
3	F	29/39 (74%)	29 (100%)	0	0	100	100
All	All	371/434 (86%)	364 (98%)	5 (1%)	2 (0%)	24	16

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	C	166	ASP
2	D	166	ASP

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	92/98 (94%)	89 (97%)	3 (3%)	33	26

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	B	93/98 (95%)	90 (97%)	3 (3%)	34	27
2	C	55/64 (86%)	55 (100%)	0	100	100
2	D	55/64 (86%)	55 (100%)	0	100	100
3	E	28/35 (80%)	27 (96%)	1 (4%)	31	23
3	F	28/35 (80%)	27 (96%)	1 (4%)	31	23
All	All	351/394 (89%)	343 (98%)	8 (2%)	44	40

5 of 8 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	F	92	LEU
3	E	92	LEU
1	A	166	ARG
1	A	138	LEU
1	A	175	LYS

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

Mol	Chain	Res	Type
2	C	169	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 [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(Å ²)	Q<0.9
1	A	98/105 (93%)	-1.35	0 100 100	17, 28, 54, 105	0
1	B	99/105 (94%)	-1.37	0 100 100	17, 29, 57, 105	0
2	C	62/73 (84%)	-1.31	0 100 100	19, 30, 69, 92	0
2	D	62/73 (84%)	-1.31	0 100 100	19, 31, 69, 94	0
3	E	31/39 (79%)	-1.25	0 100 100	17, 25, 74, 101	0
3	F	31/39 (79%)	-1.30	0 100 100	17, 25, 74, 100	0
All	All	383/434 (88%)	-1.33	0 100 100	17, 29, 71, 105	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 oligosaccharides 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.