Full wwPDB X-ray Structure Validation Report ⓘ

Apr 22, 2026 – 06:07 PM JST

PDB ID	:	9VA6 / pdb_00009va6
Title	:	Crystal structure of the PDZ tandem of syntenin
Authors	:	Ando, N.; Hanazono, Y.; Ito, N.; Hiroaki, H.
Deposited on	:	2025-06-02
Resolution	:	2.09 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 ⓘ 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:

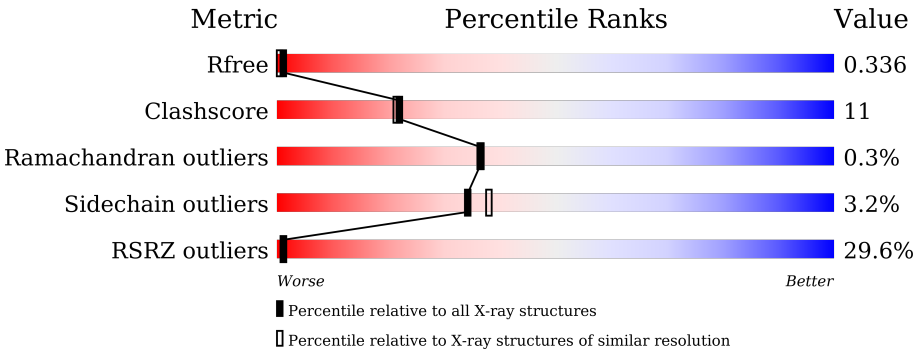
MolProbity	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)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

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 2.09 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	6658 (2.10-2.10)
Clashscore	190562	7164 (2.10-2.10)
Ramachandran outliers	187476	7099 (2.10-2.10)
Sidechain outliers	187428	7100 (2.10-2.10)
RSRZ outliers	180081	6662 (2.10-2.10)

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 <=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	166	29% 74% 25%
1	B	166	30% 77% 22%

2 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 2554 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 Syntenin-1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	165	Total	C	N	O	S	0	0	0
			1260	792	224	238	6			
1	B	166	Total	C	N	O	S	0	0	0
			1270	797	225	242	6			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	275	TYR	PHE	engineered mutation	UNP O00560
B	275	TYR	PHE	engineered mutation	UNP O00560

- Molecule 2 is water.

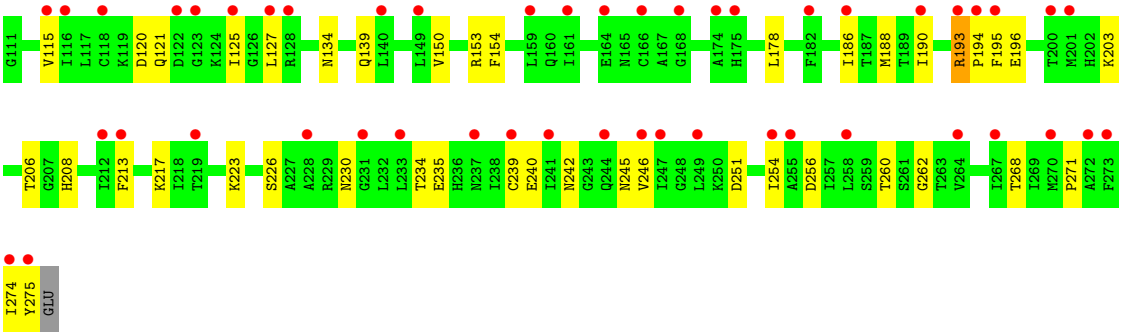
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	14	Total	O	0	0
			14	14		
2	B	10	Total	O	0	0
			10	10		

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.

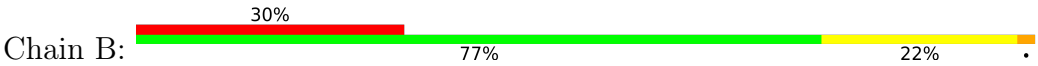
• Molecule 1: Syntenin-1

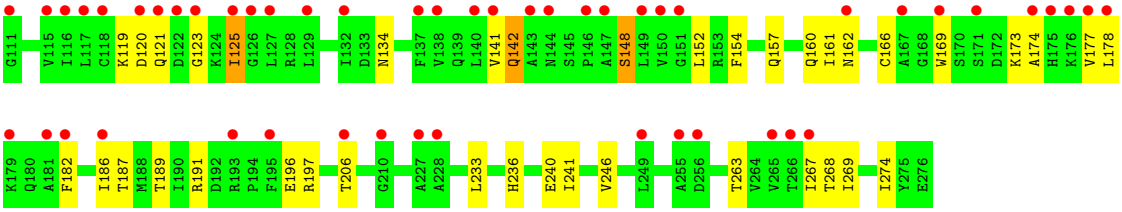
Chain A:



• Molecule 1: Syntenin-1

Chain B:





4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, α, β, γ	56.95Å 56.95Å 150.36Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	41.24 – 2.09 41.24 – 2.09	Depositor EDS
% Data completeness (in resolution range)	100.0 (41.24-2.09) 94.2 (41.24-2.09)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.68 (at 2.08Å)	Xtriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.277 , 0.336 0.277 , 0.336	Depositor DCC
R_{free} test set	872 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å^2)	37.4	Xtriage
Anisotropy	0.570	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 41.4	EDS
L-test for twinning[2]	$< \|L\| > = 0.43$, $< L^2 > = 0.26$	Xtriage
Estimated twinning fraction	0.076 for -h,-k,l	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	2554	wwPDB-VP
Average B, all atoms (Å^2)	58.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.22% 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	0.12	0/1276	0.29	0/1718
1	B	0.11	0/1286	0.32	0/1730
All	All	0.12	0/2562	0.31	0/3448

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

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	1260	0	1294	34	0
1	B	1270	0	1300	24	0
2	A	14	0	0	2	0
2	B	10	0	0	0	0
All	All	2554	0	2594	55	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 11.

All (55) 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:217:LYS:HZ3	1:A:235:GLU:HA	1.44	0.80

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:115:VAL:HG13	1:A:150:VAL:HG21	1.76	0.67
1:A:153:ARG:HD2	1:A:193:ARG:NH1	2.14	0.62
1:B:125:ILE:HD11	1:B:178:LEU:HD22	1.83	0.61
1:A:154:PHE:O	1:A:193:ARG:NE	2.33	0.61
1:A:125:ILE:HD11	1:A:186:ILE:HD12	1.83	0.60
1:A:134:ASN:ND2	2:A:302:HOH:O	2.35	0.59
1:A:153:ARG:HD2	1:A:193:ARG:HD2	1.84	0.59
1:A:217:LYS:NZ	1:A:235:GLU:HA	2.19	0.56
1:A:206:THR:OG1	1:A:208:HIS:ND1	2.39	0.56
1:A:223:LYS:NZ	2:A:301:HOH:O	2.26	0.55
1:B:119:LYS:HD3	1:B:125:ILE:HG23	1.90	0.54
1:A:153:ARG:HD2	1:A:193:ARG:CZ	2.38	0.53
1:A:230:ASN:O	1:B:191:ARG:NH2	2.36	0.53
1:B:162:ASN:HD21	1:B:186:ILE:HA	1.72	0.53
1:A:240:GLU:HB2	1:A:268:THR:HB	1.90	0.52
1:A:153:ARG:CD	1:A:193:ARG:HD2	2.39	0.52
1:B:119:LYS:HZ2	1:B:123:GLY:HA2	1.75	0.52
1:A:154:PHE:HE1	1:A:274:ILE:HG12	1.76	0.51
1:B:169:TRP:HE3	1:B:174:ALA:HB2	1.77	0.49
1:A:120:ASP:C	1:A:120:ASP:OD1	2.55	0.49
1:B:241:ILE:HG12	1:B:267:ILE:HD13	1.94	0.49
1:A:213:PHE:C	1:A:213:PHE:CD1	2.91	0.49
1:A:203:LYS:HD2	1:A:262:GLY:O	2.13	0.49
1:A:246:VAL:HB	1:A:254:ILE:HD13	1.94	0.49
1:B:160:GLN:HB2	1:B:189:THR:HB	1.95	0.49
1:B:162:ASN:ND2	1:B:187:THR:H	2.11	0.49
1:A:127:LEU:HD21	1:A:178:LEU:HD13	1.95	0.48
1:B:161:ILE:HD12	1:B:169:TRP:HZ3	1.79	0.48
1:A:153:ARG:NE	1:A:193:ARG:HD2	2.28	0.47
1:A:188:MET:HE3	1:A:190:ILE:HD11	1.96	0.47
1:B:161:ILE:HG13	1:B:166:CYS:SG	2.54	0.47
1:B:157:GLN:HB3	1:B:191:ARG:HB3	1.95	0.47
1:A:239:CYS:HB2	1:A:268:THR:HG22	1.96	0.47
1:B:196:GLU:HG3	1:B:268:THR:HG23	1.96	0.47
1:A:213:PHE:HE1	1:A:251:ASP:CG	2.23	0.46
1:A:226:SER:O	1:A:230:ASN:ND2	2.41	0.46
1:A:120:ASP:OD1	1:A:121:GLN:O	2.34	0.45
1:B:236:HIS:CD2	1:B:269:ILE:HD12	2.51	0.45
1:B:141:VAL:HG21	1:B:152:LEU:O	2.16	0.45
1:A:195:PHE:HB3	1:A:271:PRO:HD2	1.98	0.45
1:B:197:ARG:HH22	1:B:233:LEU:HD12	1.82	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:234:THR:HG23	1:B:134:ASN:HB2	1.99	0.44
1:A:240:GLU:HG2	1:A:245:ASN:HA	2.00	0.43
1:B:119:LYS:NZ	1:B:123:GLY:HA2	2.33	0.43
1:A:194:PRO:O	1:B:197:ARG:HD3	2.18	0.43
1:A:154:PHE:CE1	1:A:274:ILE:HG12	2.53	0.43
1:B:154:PHE:CE1	1:B:274:ILE:HD12	2.53	0.42
1:B:173:LYS:O	1:B:177:VAL:HG23	2.20	0.42
1:A:139:GLN:HA	1:A:274:ILE:HD11	2.02	0.41
1:A:193:ARG:HD3	1:A:196:GLU:OE1	2.21	0.41
1:B:241:ILE:HD12	1:B:246:VAL:HG11	2.02	0.41
1:B:120:ASP:CG	1:B:121:GLN:HG2	2.46	0.41
1:B:142:GLN:O	1:B:148:SER:HB3	2.20	0.40
1:A:256:ASP:O	1:A:260:THR:HG23	2.21	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	163/166 (98%)	158 (97%)	4 (2%)	1 (1%)	21 18
1	B	164/166 (99%)	151 (92%)	13 (8%)	0	100 100
All	All	327/332 (98%)	309 (94%)	17 (5%)	1 (0%)	36 36

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	193	ARG

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	140/141 (99%)	138 (99%)	2 (1%)	59 67
1	B	141/141 (100%)	134 (95%)	7 (5%)	22 22
All	All	281/282 (100%)	272 (97%)	9 (3%)	34 38

All (9) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	242	ASN
1	A	275	TYR
1	B	125	ILE
1	B	142	GLN
1	B	148	SER
1	B	182	PHE
1	B	206	THR
1	B	240	GLU
1	B	263	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	160	GLN
1	B	139	GLN
1	B	162	ASN
1	B	253	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

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	165/166 (99%)	1.65	48 (29%)	1	1	35, 54, 74, 86	0
1	B	166/166 (100%)	1.78	50 (30%)	1	1	39, 57, 95, 135	0
All	All	331/332 (99%)	1.72	98 (29%)	1	1	35, 56, 85, 135	0

All (98) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	125	ILE	5.6
1	B	117	LEU	5.1
1	B	122	ASP	4.7
1	B	116	ILE	4.2
1	B	186	ILE	4.2
1	B	162	ASN	4.0
1	A	273	PHE	3.8
1	B	182	PHE	3.8
1	B	123	GLY	3.8
1	B	174	ALA	3.8
1	A	270	MET	3.7
1	A	127	LEU	3.7
1	B	146	PRO	3.7
1	B	171	SER	3.6
1	B	126	GLY	3.5
1	A	254	ILE	3.5
1	B	147	ALA	3.4
1	B	138	VAL	3.4
1	B	178	LEU	3.4
1	A	274	ILE	3.3
1	B	140	LEU	3.3
1	A	182	PHE	3.3
1	A	201	MET	3.2
1	A	264	VAL	3.2

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Mol	Chain	Res	Type	RSRZ
1	B	127	LEU	3.2
1	B	120	ASP	3.1
1	B	149	LEU	3.1
1	B	150	VAL	3.1
1	B	228	ALA	3.1
1	A	149	LEU	3.1
1	A	246	VAL	3.0
1	B	144	ASN	3.0
1	A	219	THR	3.0
1	A	231	GLY	3.0
1	A	116	ILE	2.9
1	A	258	LEU	2.8
1	A	115	VAL	2.8
1	B	141	VAL	2.8
1	B	255	ALA	2.8
1	B	177	VAL	2.8
1	A	122	ASP	2.8
1	B	193	ARG	2.7
1	A	195	PHE	2.7
1	A	174	ALA	2.7
1	B	118	CYS	2.7
1	A	123	GLY	2.7
1	A	247	ILE	2.7
1	A	128	ARG	2.7
1	B	181	ALA	2.7
1	A	213	PHE	2.6
1	B	179	LYS	2.6
1	B	206	THR	2.6
1	B	227	ALA	2.6
1	B	195	PHE	2.5
1	A	233	LEU	2.5
1	B	169	TRP	2.5
1	A	267	ILE	2.5
1	B	256	ASP	2.4
1	B	129	LEU	2.4
1	B	115	VAL	2.4
1	B	249	LEU	2.4
1	A	125	ILE	2.4
1	A	161	ILE	2.4
1	A	164	GLU	2.3
1	A	249	LEU	2.3
1	B	137	PHE	2.3

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Mol	Chain	Res	Type	RSRZ
1	B	175	HIS	2.3
1	B	265	VAL	2.3
1	A	200	THR	2.3
1	B	143	ALA	2.3
1	A	118	CYS	2.3
1	A	255	ALA	2.3
1	A	168	GLY	2.3
1	A	212	ILE	2.2
1	B	132	ILE	2.2
1	A	228	ALA	2.2
1	B	111	GLY	2.2
1	A	190	ILE	2.2
1	B	167	ALA	2.2
1	A	239	CYS	2.2
1	A	186	ILE	2.2
1	A	140	LEU	2.2
1	A	194	PRO	2.1
1	A	241	ILE	2.1
1	B	267	ILE	2.1
1	B	151	GLY	2.1
1	A	159	LEU	2.1
1	A	237	ASN	2.1
1	A	275	TYR	2.1
1	A	175	HIS	2.1
1	A	166	CYS	2.1
1	B	121	GLN	2.1
1	B	210	GLY	2.1
1	B	176	LYS	2.1
1	A	272	ALA	2.0
1	A	244	GLN	2.0
1	A	193	ARG	2.0
1	B	266	THR	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 oligosaccharides in this entry.

6.4 Ligands

There are no ligands in this entry.

6.5 Other polymers

There are no such residues in this entry.