



wwPDB X-ray Structure Validation Summary Report

Feb 1, 2016 – 09:13 AM GMT

PDB ID : 3HN8
Title : Crystal structure of synaptotagmin
Authors : Strop, P.; Vrljic, M.; Ernst, J.; Brunger, A.T.
Deposited on : 2009-05-30
Resolution : 3.50 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
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>
with specific help available everywhere you see the  symbol.

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

MolProbity : 4.02b-467
Mogul : 1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix) : 1.9-1692
EDS : rb-20026688
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)
Refmac : 5.8.0135
CCP4 : 6.5.0
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : trunk26865

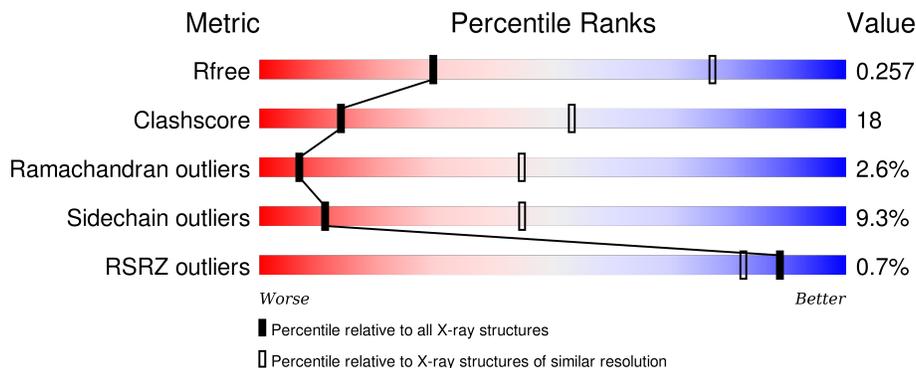
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.50 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}	91344	1051 (3.60-3.40)
Clashscore	102246	1157 (3.60-3.40)
Ramachandran outliers	100387	1120 (3.60-3.40)
Sidechain outliers	100360	1121 (3.60-3.40)
RSRZ outliers	91569	1058 (3.60-3.40)

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. 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	296	
1	B	296	
1	C	296	

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 6672 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 Synaptotagmin-3.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	279	2217	1417	385	409	6	0	0	0
1	B	279	2217	1417	385	409	6	0	0	0
1	C	279	2217	1417	385	409	6	0	0	0

- Molecule 2 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	B	6	Total 6	Ca 6	0	0
2	A	6	Total 6	Ca 6	0	0
2	C	6	Total 6	Ca 6	0	0

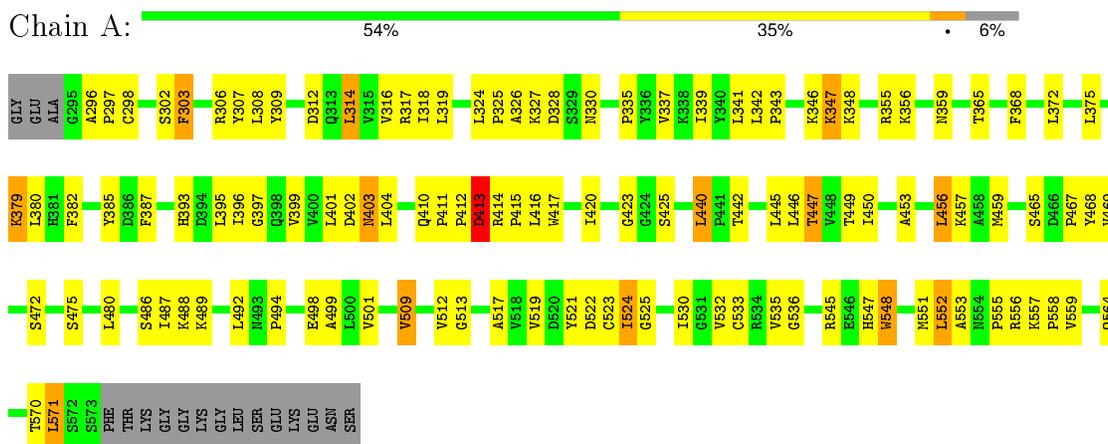
- Molecule 3 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	B	1	Total 1	Zn 1	0	0
3	A	1	Total 1	Zn 1	0	0
3	C	1	Total 1	Zn 1	0	0

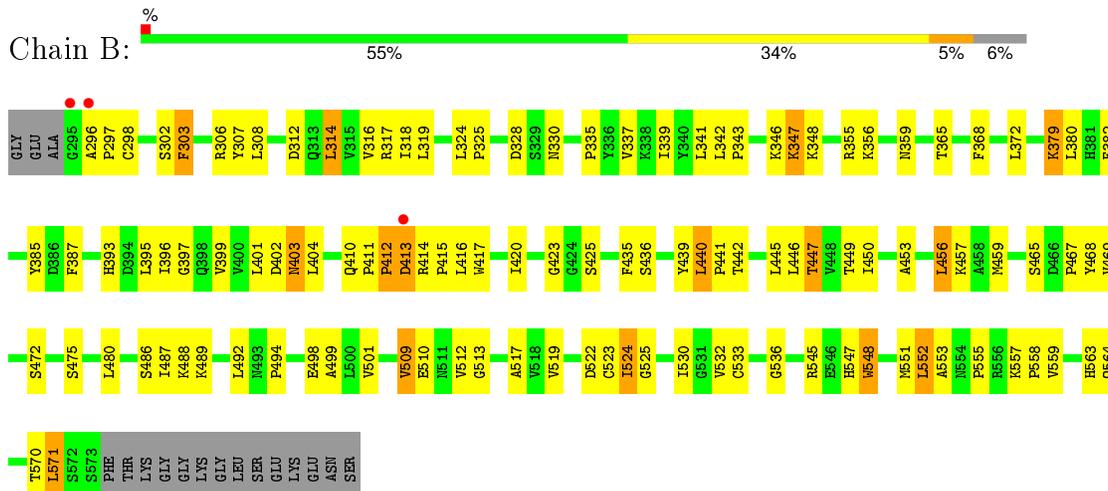
3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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: Synaptotagmin-3



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- Molecule 1: Synaptotagmin-3



K379	P467	T570	THR	K379
L380	Y468	L571	LYS	L380
H381	V469	S572	GLY	H381
F382	S472	S573	GLY	F382
Y385	S475		LYS	Y385
D386	L480		LYS	D386
F387	S486		LYS	F387
H393	I487		LEU	H393
D394	K488		SER	D394
L395	K489		GLU	L395
I396	L492		LYS	I396
G397	M493		GLU	G397
Q398	P494		ASN	Q398
V399	E498		SER	V399
V400	A499			V400
L401	L500			L401
D402	V501			D402
M403	V509			M403
L404	V512			L404
Q410	G513			Q410
P411	A517			P411
D413	D522			D413
R414	C523			R414
P415	I524			P415
L416	G525			L416
H417	I530			H417
I420	G531			I420
G423	V532			G423
G424	C533			G424
S425	G536			S425
S436	R545			S436
Y439	E546			Y439
L440	H547			L440
P441	W548			P441
T442	M551			T442
L445	L552			L445
L446	A553			L446
T447	M554			T447
V448	P555			V448
T449	R556			T449
I450	K557			I450
A453	P558			A453
L456	V559			L456
K457	Q564			K457
L458				L458
M459				M459
S465				S465
D466				D466

4 Data and refinement statistics

Property	Value	Source
Space group	P 41 21 2	Depositor
Cell constants a, b, c, α , β , γ	205.68Å 205.68Å 143.12Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.82 – 3.50 29.82 – 3.50	Depositor EDS
% Data completeness (in resolution range)	99.8 (29.82-3.50) 99.8 (29.82-3.50)	Depositor EDS
R_{merge}	0.17	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.29 (at 3.47Å)	Xtrriage
Refinement program	PHENIX	Depositor
R, R_{free}	0.238 , 0.259 0.232 , 0.257	Depositor DCC
R_{free} test set	3928 reflections (10.06%)	DCC
Wilson B-factor (Å ²)	79.4	Xtrriage
Anisotropy	0.706	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 56.8	EDS
Estimated twinning fraction	No twinning to report.	Xtrriage
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtrriage
Outliers	0 of 39072 reflections	Xtrriage
F_o, F_c correlation	0.90	EDS
Total number of atoms	6672	wwPDB-VP
Average B, all atoms (Å ²)	90.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.21% of the height of the origin peak. No significant pseudotranslation is detected.*

¹ Intensities estimated from amplitudes.

² Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.375 respectively for untwinned datasets, and 0.333, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: ZN, CA

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	0.27	0/2268	0.50	0/3076
1	B	0.26	0/2268	0.49	0/3076
1	C	0.27	0/2268	0.50	0/3076
All	All	0.26	0/6804	0.50	0/9228

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
1	A	0	1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	413	ASP	Peptide

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	2217	0	2228	89	0
1	B	2217	0	2228	82	0
1	C	2217	0	2228	84	0
2	A	6	0	0	0	0
2	B	6	0	0	0	0
2	C	6	0	0	0	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
All	All	6672	0	6684	246	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 18.

The worst 5 of 246 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:556:ARG:HG3	1:C:310:GLY:HA2	1.38	1.01
1:A:556:ARG:HB2	1:C:310:GLY:H	1.46	0.80
1:A:556:ARG:CG	1:C:310:GLY:HA2	2.10	0.80
1:B:303:PHE:HA	1:B:319:LEU:HG	1.65	0.79
1:A:303:PHE:HA	1:A:319:LEU:HG	1.65	0.78

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	277/296 (94%)	234 (84%)	36 (13%)	7 (2%)	7 46
1	B	277/296 (94%)	231 (83%)	38 (14%)	8 (3%)	6 42
1	C	277/296 (94%)	234 (84%)	36 (13%)	7 (2%)	7 46

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
All	All	831/888 (94%)	699 (84%)	110 (13%)	22 (3%)	7 45

5 of 22 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	347	LYS
1	A	524	ILE
1	B	347	LYS
1	B	524	ILE
1	C	347	LYS

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	244/256 (95%)	220 (90%)	24 (10%)	10 42
1	B	244/256 (95%)	222 (91%)	22 (9%)	12 46
1	C	244/256 (95%)	222 (91%)	22 (9%)	12 46
All	All	732/768 (95%)	664 (91%)	68 (9%)	11 45

5 of 68 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	355	ARG
1	B	447	THR
1	C	472	SER
1	B	359	ASN
1	B	416	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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 carbohydrates in this entry.

5.6 Ligand geometry [i](#)

Of 21 ligands modelled in this entry, 21 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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	279/296 (94%)	-0.48	0 100 100	54, 79, 141, 221	0
1	B	279/296 (94%)	-0.37	3 (1%) 82 73	54, 89, 160, 218	0
1	C	279/296 (94%)	-0.43	3 (1%) 82 73	53, 78, 147, 230	0
All	All	837/888 (94%)	-0.43	6 (0%) 89 82	53, 82, 149, 230	0

The worst 5 of 6 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	295	GLY	5.0
1	C	295	GLY	4.6
1	C	413	ASP	2.6
1	B	296	ALA	2.3
1	C	296	ALA	2.2

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](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors

of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(Å ²)	Q<0.9
2	CA	C	601	1/1	0.92	0.17	-0.36	50,50,50,50	0
2	CA	A	606	1/1	0.95	0.15	-1.11	57,57,57,57	0
2	CA	A	600	1/1	0.96	0.15	-1.22	58,58,58,58	0
2	CA	A	605	1/1	0.97	0.12	-1.29	55,55,55,55	0
2	CA	C	605	1/1	0.97	0.13	-1.34	65,65,65,65	0
2	CA	A	601	1/1	0.94	0.10	-1.45	50,50,50,50	0
2	CA	C	600	1/1	0.98	0.12	-1.49	51,51,51,51	0
2	CA	B	606	1/1	0.88	0.08	-1.82	57,57,57,57	0
2	CA	C	602	1/1	0.87	0.10	-1.84	64,64,64,64	0
2	CA	B	601	1/1	0.91	0.07	-2.11	50,50,50,50	0
2	CA	C	606	1/1	0.88	0.10	-2.39	35,35,35,35	0
2	CA	A	602	1/1	0.95	0.07	-2.40	51,51,51,51	0
2	CA	B	600	1/1	0.98	0.12	-3.32	53,53,53,53	0
2	CA	B	605	1/1	0.92	0.06	-3.58	51,51,51,51	0
2	CA	B	602	1/1	0.98	0.06	-3.59	52,52,52,52	0
3	ZN	B	700	1/1	0.97	0.10	-	74,74,74,74	0
2	CA	A	603	1/1	0.87	0.08	-	79,79,79,79	0
3	ZN	C	700	1/1	0.98	0.09	-	58,58,58,58	0
3	ZN	A	700	1/1	0.99	0.10	-	65,65,65,65	0
2	CA	B	603	1/1	0.91	0.08	-	76,76,76,76	0
2	CA	C	603	1/1	0.93	0.15	-	98,98,98,98	0

6.5 Other polymers [i](#)

There are no such residues in this entry.