Full wwPDB NMR Structure Validation Report (i)

Jun 15, 2024 – 02:05 PM EDT

PDB ID	:	1WCT
Title	:	A NOVEL CONOTOXIN FROM CONUS TEXTILE WITH UNUSUAL POST-TRANSLATIONAL MODIFICATIONS REDUCES PRESYNAPTIC CALCIUM INFLUX, NMR, 1 STRUCTURE, GLYCOSYLATED PROTEIN
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Deposited on	:	1998-12-18

This is a Full wwPDB NMR 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/NMRValidationReportHelp
with specific help available everywhere you see the (i) symbol.

The types of validation reports are described at
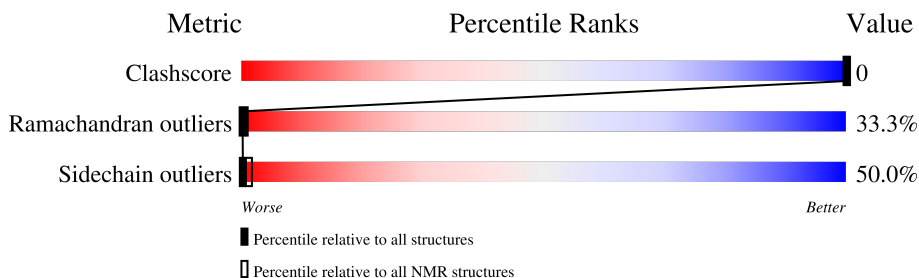http://www.wwpdb.org/validation/2017/FAQs#types.

1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:
SOLUTION NMR

The overall completeness of chemical shifts assignment was not calculated.

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	Percentile Ranks	Value
Clashscore		0
Ramachandran outliers		33.3%
Sidechain outliers		50.0%

Worse *Better*

▌Percentile relative to all structures

▯Percentile relative to all NMR structures

Metric	Whole archive (#Entries)	NMR archive (#Entries)
Clashscore	158937	12864
Ramachandran outliers	154571	11451
Sidechain outliers	154315	11428

The table below summarises the geometric issues observed across the polymeric chains and their fit to the experimental data. The red, orange, yellow and green segments indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria. A cyan segment indicates the fraction of residues that are not part of the well-defined cores, and 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%

Mol	Chain	Length	Quality of chain
1	A	13	31%　54%　15%
2	B	2	100%

2 Ensemble composition and analysis ⓘ

This entry contains 1 models. Identification of well-defined residues and clustering analysis are not possible.

3 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 218 atoms, of which 92 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called OMEGAC-TXIX.

Mol	Chain	Residues	Atoms							Trace
			Total	Br	C	H	N	O	S	
1	A	13	169	1	56	68	14	26	4	0

- Molecule 2 is an oligosaccharide called beta-D-galactopyranose-(1-3)-2-acetamido-2-deoxy-beta-D-galactopyranose.
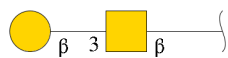
Mol	Chain	Residues	Atoms					Trace
			Total	C	H	N	O	
2	B	2	49	14	24	1	10	0

4 Residue-property plots ⓘ

These plots are provided for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic is the same as shown in the summary in section 1 of this report. The second graphic shows the sequence where residues are colour-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. Stretches of 2 or more consecutive residues without any outliers are shown as green connectors. Residues which are classified as ill-defined in the NMR ensemble, are shown in cyan with an underline colour-coded according to the previous scheme. Residues which were present in the experimental sample, but not modelled in the final structure are shown in grey.

• Molecule 1: OMEGAC-TXIX

Chain A:

| 31% | 54% | 15% |

E1 C2 C3 E4 D5 G6 W7 C8 C9 T10 A11 A12 P13

• Molecule 2: beta-D-galactopyranose-(1-3)-2-acetamido-2-deoxy-beta-D-galactopyranose

Chain B:

| 100% |

NGA1 GAL2

5 Refinement protocol and experimental data overview ⓘ

The models were refined using the following method: *DGII*.

Of the 40 calculated structures, 1 were deposited, based on the following criterion: *LOWEST ENERGY*.

The following table shows the software used for structure solution, optimisation and refinement.

Software name	Classification	Version
DGII	refinement	
Insight II	structure solution	

No chemical shift data was provided.

6 Model quality ⓘ

6.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: HYP, NGA, GAL, BTR, CGU

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 (average) 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	1.52	0/50 (0.0%)	1.45	2/63 (3.2%)
All	All	1.52	0/50 (0.0%)	1.45	2/63 (3.2%)

There are no bond-length outliers.

All angle outliers are listed below. They are sorted according to the Z-score.

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	5	ASP	CB-CG-OD1	5.68	123.41	118.30
1	A	5	ASP	CB-CG-OD2	-5.65	113.22	118.30

There are no chirality outliers.

There are no planarity outliers.

6.2 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 each 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 averaged over the ensemble.

Mol	Chain	Non-H	H(model)	H(added)	Clashes
All	All	126	92	87	-

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 -.

There are no clashes.

6.3 Torsion angles ⓘ

6.3.1 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 PDB entries followed by that with respect to all NMR entries. 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	9/13 (69%)	4 (44%)	2 (22%)	3 (33%)	0	0
All	All	9/13 (69%)	4 (44%)	2 (22%)	3 (33%)	0	0

All 3 Ramachandran outliers are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type
1	A	2	CYS
1	A	10	THR
1	A	11	ALA

6.3.2 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 PDB entries followed by that with respect to all NMR entries. 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	6/6 (100%)	3 (50%)	3 (50%)	0	1
All	All	6/6 (100%)	3 (50%)	3 (50%)	0	1

All 3 residues with a non-rotameric sidechain are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type
1	A	2	CYS
1	A	5	ASP
1	A	8	CYS

6.3.3 RNA ⓘ

There are no RNA molecules in this entry.

6.4 Non-standard residues in protein, DNA, RNA chains ⓘ

4 non-standard protein/DNA/RNA residues are modelled in this entry.

In the following table, the Counts columns list the number of bonds for which Mogul statistics could be retrieved, the number of bonds that are observed in the model and the number of bonds that are defined in the chemical component dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length is the number of standard deviations the observed value is removed from the expected value. A bond length with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the average root-mean-square of all Z scores of the bond lengths.

Mol	Type	Chain	Res	Link	Bond lengths		
					Counts	RMSZ	#Z>2
1	CGU	A	1	1	9,11,12	1.42	1 (11%)
1	HYP	A	13	1	9,9,9	1.43	1 (11%)
1	CGU	A	4	1	9,11,12	1.40	1 (11%)
1	BTR	A	7	1	14,16,17	1.31	3 (21%)

In the following table, the Counts columns list the number of angles for which Mogul statistics could be retrieved, the number of angles that are observed in the model and the number of angles that are defined in the chemical component dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond angle is the number of standard deviations the observed value is removed from the expected value. A bond angle with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the average root-mean-square of all Z scores of the bond angles.

Mol	Type	Chain	Res	Link	Bond angles		
					Counts	RMSZ	#Z>2
1	CGU	A	1	1	10,14,16	1.09	1 (10%)
1	HYP	A	13	1	10,12,12	1.49	3 (30%)
1	CGU	A	4	1	10,14,16	0.86	0 (0%)
1	BTR	A	7	1	13,22,24	1.19	0 (0%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the chemical component dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	CGU	A	1	1	-	0,13,14,16	-
1	HYP	A	13	1	-	0,4,13,13	0,1,1,1
1	CGU	A	4	1	-	0,13,14,16	-
1	BTR	A	7	1	-	0,4,6,8	0,2,2,2

All bond outliers are listed below. They are sorted according to the Z-score.

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	13	HYP	OXT-C	4.02	1.43	1.30
1	A	1	CGU	CG-CD2	2.22	1.55	1.52
1	A	7	BTR	CD1-NE1	2.18	1.41	1.36
1	A	4	CGU	CG-CD2	2.15	1.54	1.52
1	A	7	BTR	BR2-CH2	2.10	1.94	1.90
1	A	7	BTR	CZ2-CH2	2.00	1.40	1.36

All angle outliers are listed below. They are sorted according to the Z-score.

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	13	HYP	OXT-C-O	2.80	117.73	124.08
1	A	13	HYP	CB-CA-N	2.45	101.47	106.20
1	A	1	CGU	CB-CA-C	2.39	114.68	110.99
1	A	13	HYP	C-CA-N	2.18	115.36	106.84

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

6.5 Carbohydrates (i)

2 monosaccharides are modelled in this entry.

In the following table, the Counts columns list the number of bonds for which Mogul statistics could be retrieved, the number of bonds that are observed in the model and the number of bonds that are defined in the chemical component dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length is the number of standard deviations the observed value is removed from the expected value. A bond length with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the average root-mean-square of all Z scores of the bond lengths.

Mol	Type	Chain	Res	Link	Bond lengths		
					Counts	RMSZ	#Z>2
2	NGA	B	1	1,2	14,14,15	1.47	1 (7%)

Mol	Type	Chain	Res	Link	Bond lengths		
					Counts	RMSZ	#Z>2
2	GAL	B	2	2	11,11,12	1.16	1 (9%)

In the following table, the Counts columns list the number of angles for which Mogul statistics could be retrieved, the number of angles that are observed in the model and the number of angles that are defined in the chemical component dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond angle is the number of standard deviations the observed value is removed from the expected value. A bond angle with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the average root-mean-square of all Z scores of the bond angles.

Mol	Type	Chain	Res	Link	Bond angles		
					Counts	RMSZ	#Z>2
2	NGA	B	1	1,2	17,19,21	1.94	1 (5%)
2	GAL	B	2	2	15,15,17	1.10	1 (6%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the chemical component dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NGA	B	1	1,2	-	0,6,23,26	0,1,1,1
2	GAL	B	2	2	-	0,2,19,22	0,1,1,1

All bond outliers are listed below. They are sorted according to the Z-score.

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	1	NGA	C1-C2	3.45	1.57	1.52
2	B	2	GAL	C2-C3	2.15	1.55	1.52

All angle outliers are listed below. They are sorted according to the Z-score.

| Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	1	NGA	C1-O5-C5	7.30	121.97	112.19
2	B	2	GAL	C1-O5-C5	3.92	117.44	112.19

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths,

bond angles, torsion angles, and ring geometry for oligosaccharide.

Oligosaccharide Chain B

Bond lengths   Bond angles

Torsions   Rings
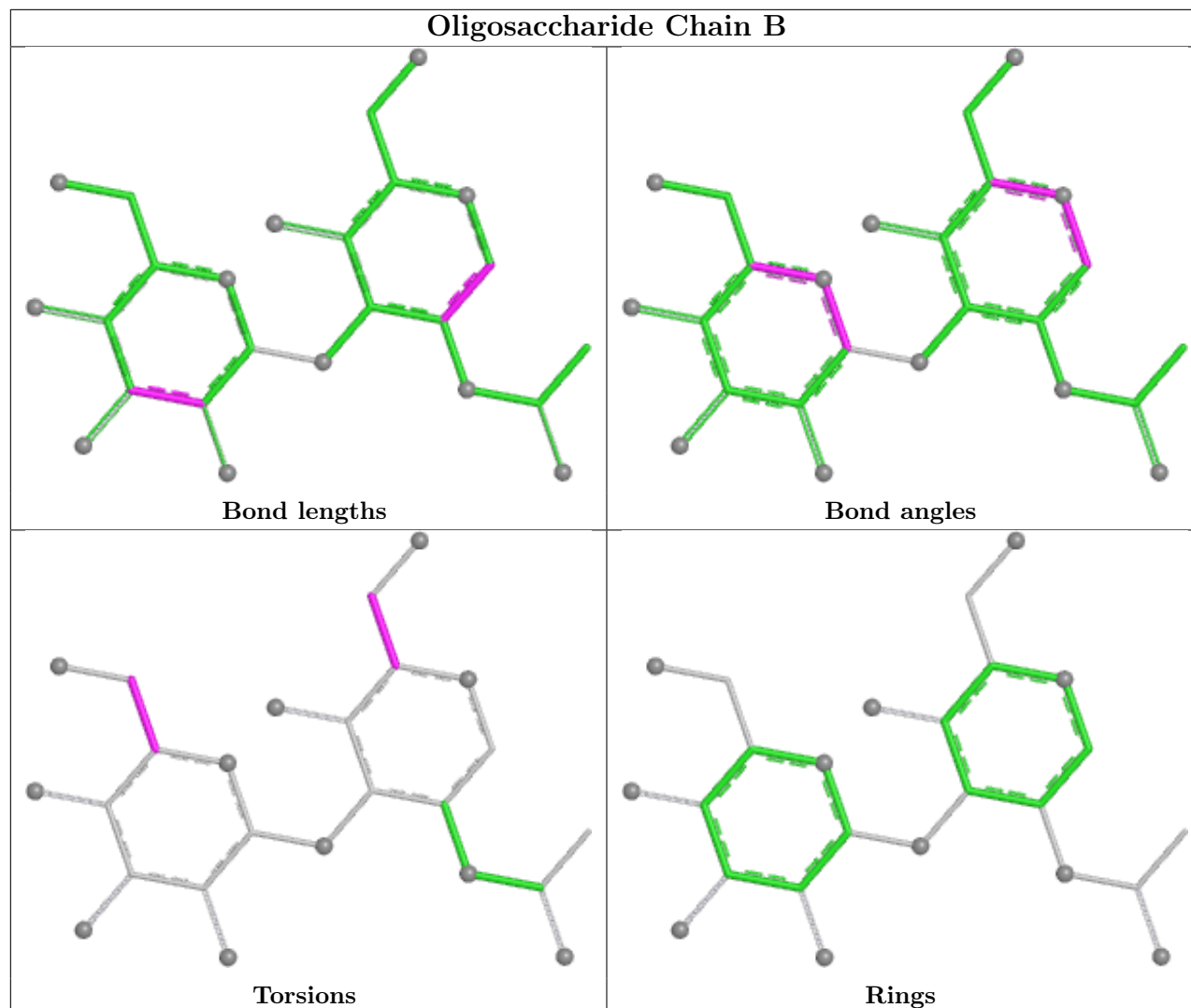
6.6 Ligand geometry ⓘ

There are no ligands in this entry.

6.7 Other polymers ⓘ

There are no such molecules in this entry.

6.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

7 Chemical shift validation ⓘ

No chemical shift data were provided