



# wwPDB X-ray Structure Validation Summary Report ⓘ

Oct 20, 2024 – 08:38 PM EDT

PDB ID : 1FNV  
Title : STRUCTURE OF STREPTOCOCCAL PYROGENIC EXOTOXIN A  
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Deposited on : 2000-08-23  
Resolution : 3.60 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](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) : **NOT EXECUTED**  
EDS : **NOT EXECUTED**  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.39

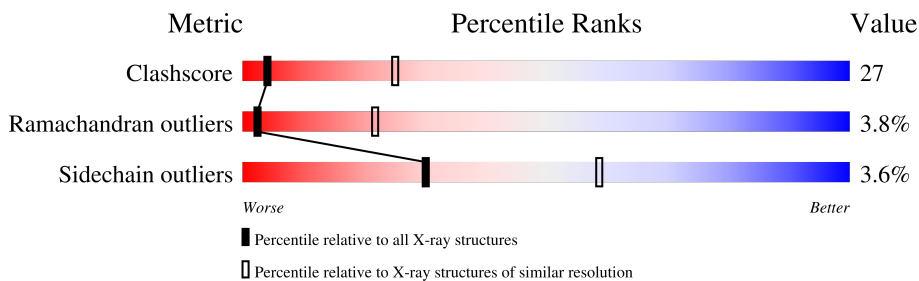
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.60 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))
Clashscore	180529	1665 (3.70-3.50)
Ramachandran outliers	177936	1641 (3.70-3.50)
Sidechain outliers	177891	1640 (3.70-3.50)

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  $\leq 5\%$ .

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	221	58% 37% 5%
1	B	221	59% 36% 5%
1	C	221	56% 40% .
1	D	221	59% 35% 5%

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 7308 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 EXOTOXIN TYPE A PRECURSOR (ALLELE 1).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	221	Total	C	N	O	S	0	0	0
			1823	1166	293	358	6			
1	B	221	Total	C	N	O	S	0	0	0
			1823	1166	293	358	6			
1	C	221	Total	C	N	O	S	0	0	0
			1823	1166	293	358	6			
1	D	221	Total	C	N	O	S	0	0	0
			1823	1166	293	358	6			

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	153	THR	LEU	conflict	UNP P62560
A	154	ILE	THR	conflict	UNP P62560
A	209	ASN	SER	conflict	UNP P62560
A	210	LYS	ASN	conflict	UNP P62560
B	453	THR	LEU	conflict	UNP P62560
B	454	ILE	THR	conflict	UNP P62560
B	509	ASN	SER	conflict	UNP P62560
B	510	LYS	ASN	conflict	UNP P62560
C	753	THR	LEU	conflict	UNP P62560
C	754	ILE	THR	conflict	UNP P62560
C	809	ASN	SER	conflict	UNP P62560
C	810	LYS	ASN	conflict	UNP P62560
D	1053	THR	LEU	conflict	UNP P62560
D	1054	ILE	THR	conflict	UNP P62560
D	1109	ASN	SER	conflict	UNP P62560
D	1110	LYS	ASN	conflict	UNP P62560

- Molecule 2 is CADMIUM ION (three-letter code: CD) (formula: Cd).

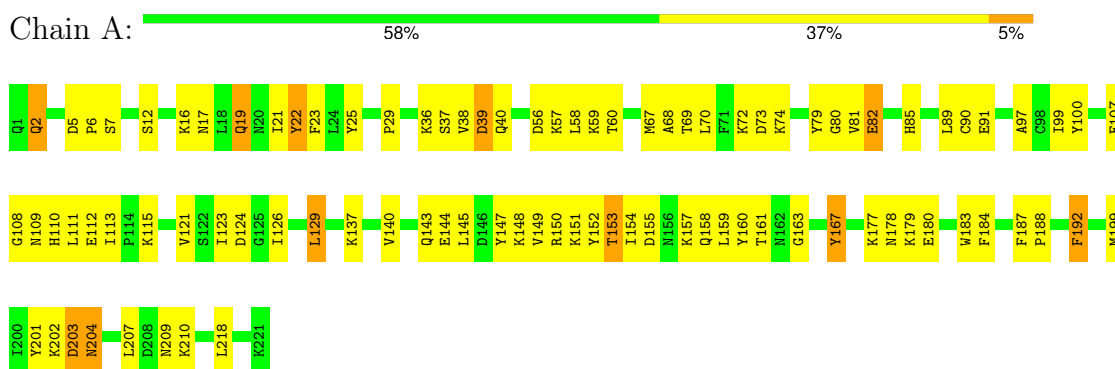
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	3	Total 3	Cd 3	0	0
2	B	4	Total 4	Cd 4	0	0
2	C	5	Total 5	Cd 5	0	0
2	D	4	Total 4	Cd 4	0	0

### 3 Residue-property plots

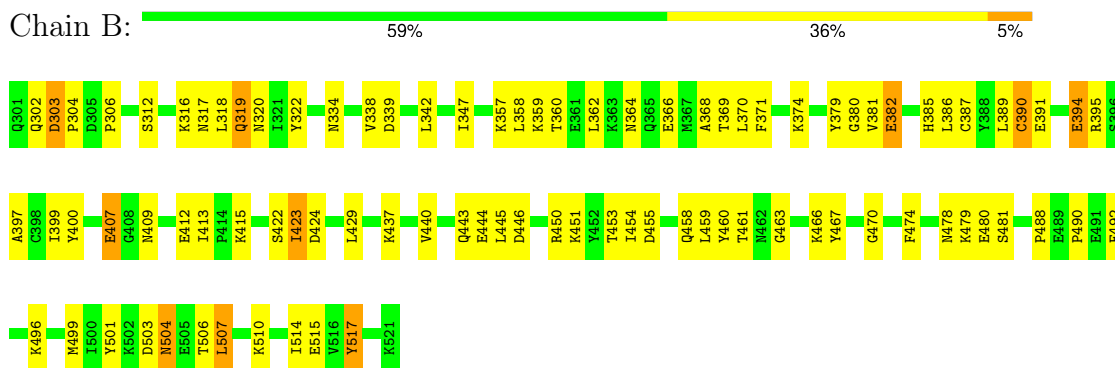
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded 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. 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.

Note EDS was not executed.

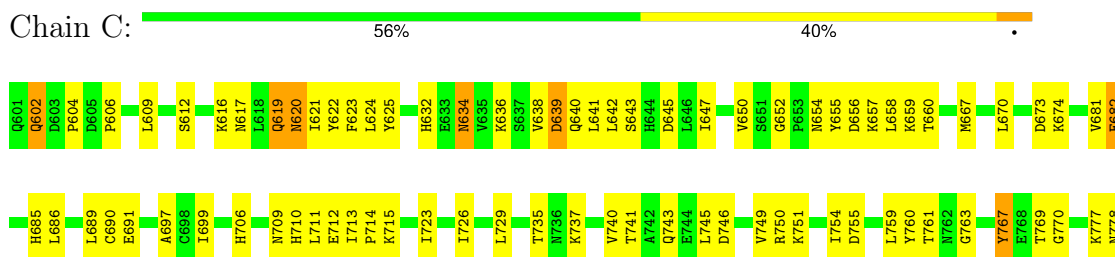
- Molecule 1: EXOTOXIN TYPE A PRECURSOR (ALLELE 1)

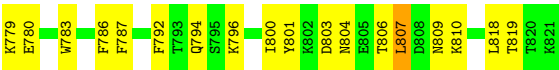


- Molecule 1: EXOTOXIN TYPE A PRECURSOR (ALLELE 1)

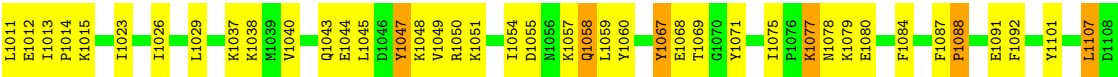


- Molecule 1: EXOTOXIN TYPE A PRECURSOR (ALLELE 1)





● Molecule 1: EXOTOXIN TYPE A PRECURSOR (ALLELE 1)



## 4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	105.48Å 130.71Å 84.52Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 3.60	Depositor
% Data completeness (in resolution range)	75.2 (20.00-3.60)	Depositor
$R_{merge}$	0.12	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	CNS	Depositor
R, $R_{free}$	0.233 , 0.304	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	7308	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	15.0	wwPDB-VP

## 5 Model quality

### 5.1 Standard geometry

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

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	0.45	0/1865	0.73	0/2522
1	B	0.44	0/1865	0.72	2/2522 (0.1%)
1	C	0.43	0/1865	0.72	0/2522
1	D	0.44	0/1865	0.71	0/2522
All	All	0.44	0/7460	0.72	2/10088 (0.0%)

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.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	394	GLU	N-CA-C	-5.17	97.03	111.00
1	B	387	CYS	CA-CB-SG	5.15	123.26	114.00

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	192	PHE	Sidechain



## 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	1823	0	1779	104	0
1	B	1823	0	1776	92	0
1	C	1823	0	1776	103	0
1	D	1823	0	1776	104	0
2	A	3	0	0	0	0
2	B	4	0	0	0	0
2	C	5	0	0	0	0
2	D	4	0	0	1	0
All	All	7308	0	7107	387	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 27.

The worst 5 of 387 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:D:990:CYS:SG	2:D:1124:CD:CD	1.39	1.29
1:B:454:ILE:HG12	1:B:459:LEU:HB3	1.39	1.05
1:D:919:GLN:H	1:D:919:GLN:HE21	0.97	0.96
1:A:19:GLN:H	1:A:19:GLN:NE2	1.66	0.94
1:C:754:ILE:HG12	1:C:759:LEU:HB3	1.50	0.93

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	219/221 (99%)	184 (84%)	25 (11%)	10 (5%)	2	18
1	B	219/221 (99%)	179 (82%)	30 (14%)	10 (5%)	2	18
1	C	219/221 (99%)	180 (82%)	33 (15%)	6 (3%)	4	28
1	D	219/221 (99%)	178 (81%)	34 (16%)	7 (3%)	3	25
All	All	876/884 (99%)	721 (82%)	122 (14%)	33 (4%)	2	22

5 of 33 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	180	GLU
1	B	480	GLU
1	C	780	GLU
1	D	1080	GLU
1	A	6	PRO

### 5.3.2 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 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	208/208 (100%)	201 (97%)	7 (3%)	32	60
1	B	208/208 (100%)	200 (96%)	8 (4%)	28	57
1	C	208/208 (100%)	202 (97%)	6 (3%)	37	63
1	D	208/208 (100%)	199 (96%)	9 (4%)	25	54
All	All	832/832 (100%)	802 (96%)	30 (4%)	30	59

5 of 30 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	517	TYR
1	D	1107	LEU
1	C	682	GLU
1	D	1121	LYS
1	D	1067	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 43 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	710	HIS
1	D	908	GLN
1	C	743	GLN
1	C	794	GLN
1	D	920	ASN

### 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 ⓘ

Of 16 ligands modelled in this entry, 16 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 ⓘ

There are no such residues in this entry.

## 5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

## 6 Fit of model and data [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

EDS was not executed - this section is therefore empty.

### 6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

EDS was not executed - this section is therefore empty.

### 6.3 Carbohydrates [i](#)

EDS was not executed - this section is therefore empty.

### 6.4 Ligands [i](#)

EDS was not executed - this section is therefore empty.

### 6.5 Other polymers [i](#)

EDS was not executed - this section is therefore empty.