



wwPDB X-ray Structure Validation Summary Report ⓘ

May 28, 2020 – 12:30 am BST

PDB ID : 4FO2
Title : Heat-labile enterotoxin LT-IIb-B5(T13I) mutant
Authors : Cody, V.; Pace, J.; Nawar, H.; Liang, S.; Connell, T.; Hajishengallis, G.
Deposited on : 2012-06-20
Resolution : 1.50 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

<https://www.wwpdb.org/validation/2017/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 : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.11
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.11

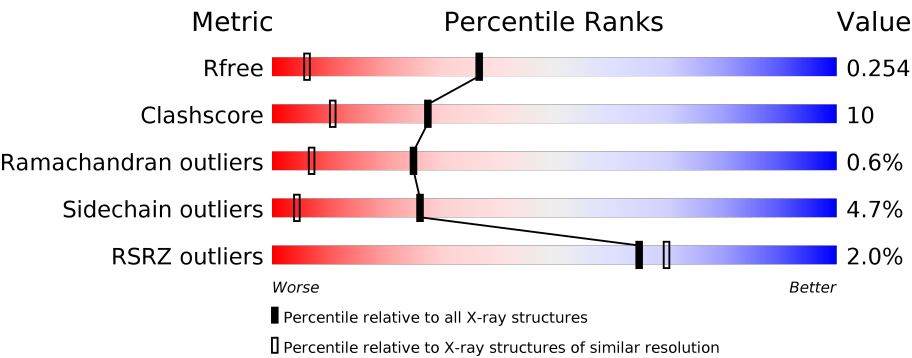
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.50 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}	130704	2936 (1.50-1.50)
Clashscore	141614	3144 (1.50-1.50)
Ramachandran outliers	138981	3066 (1.50-1.50)
Sidechain outliers	138945	3064 (1.50-1.50)
RSRZ outliers	127900	2884 (1.50-1.50)

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 on 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	98	<div><div>4%</div><div><div></div><div>73%</div><div>26%</div><div>.</div></div></div>
1	B	98	<div><div>%</div><div><div></div><div>82%</div><div>15%</div><div>..</div></div></div>
1	C	98	<div><div></div><div><div></div><div>81%</div><div>18%</div><div>.</div></div></div>
1	D	98	<div><div>7%</div><div><div></div><div>72%</div><div>19%</div><div>7%</div><div>.</div></div></div>
1	E	98	<div><div>3%</div><div><div></div><div>76%</div><div>19%</div><div>5%</div></div></div>
1	F	98	<div><div></div><div><div></div><div>83%</div><div>16%</div><div>.</div></div></div>

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Mol	Chain	Length	Quality of chain
1	G	98	
1	H	98	
1	I	98	
1	J	98	
1	K	98	
1	L	98	
1	M	98	
1	N	98	
1	O	98	
1	P	98	
1	Q	98	
1	R	98	
1	S	98	
1	T	98	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	ACT	N	101	-	-	X	-
3	ACT	Q	102	-	-	X	-

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 15396 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 Heat-labile enterotoxin IIB, B chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	D	98	Total	C	N	O	S	0	2	0
			757	469	131	148	9			
1	E	98	Total	C	N	O	S	0	0	0
			741	460	128	145	8			
1	F	98	Total	C	N	O	S	0	1	0
			749	465	129	146	9			
1	G	98	Total	C	N	O	S	0	1	0
			749	465	129	146	9			
1	H	98	Total	C	N	O	S	0	1	0
			749	465	129	146	9			
1	A	98	Total	C	N	O	S	0	0	0
			741	460	128	145	8			
1	B	98	Total	C	N	O	S	0	2	0
			760	471	133	147	9			
1	C	98	Total	C	N	O	S	0	1	0
			749	465	129	146	9			
1	I	98	Total	C	N	O	S	0	1	0
			749	465	129	146	9			
1	J	98	Total	C	N	O	S	0	1	0
			749	465	129	146	9			
1	K	98	Total	C	N	O	S	0	0	0
			741	460	128	145	8			
1	L	98	Total	C	N	O	S	0	1	0
			749	466	129	146	8			
1	M	98	Total	C	N	O	S	0	3	0
			765	475	131	148	11			
1	N	98	Total	C	N	O	S	0	1	0
			749	465	129	146	9			
1	O	98	Total	C	N	O	S	0	0	0
			735	457	125	145	8			
1	P	98	Total	C	N	O	S	0	1	0
			749	465	129	146	9			

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	Q	98	Total	C	N	O	S	0	1	0
			749	464	129	148	8			
1	R	98	Total	C	N	O	S	0	2	0
			757	470	130	147	10			
1	S	98	Total	C	N	O	S	0	1	0
			749	465	129	146	9			
1	T	98	Total	C	N	O	S	0	1	0
			749	465	129	146	9			

There are 20 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	13	ILE	THR	ENGINEERED MUTATION	UNP P43529
E	13	ILE	THR	ENGINEERED MUTATION	UNP P43529
F	13	ILE	THR	ENGINEERED MUTATION	UNP P43529
G	13	ILE	THR	ENGINEERED MUTATION	UNP P43529
H	13	ILE	THR	ENGINEERED MUTATION	UNP P43529
A	13	ILE	THR	ENGINEERED MUTATION	UNP P43529
B	13	ILE	THR	ENGINEERED MUTATION	UNP P43529
C	13	ILE	THR	ENGINEERED MUTATION	UNP P43529
I	13	ILE	THR	ENGINEERED MUTATION	UNP P43529
J	13	ILE	THR	ENGINEERED MUTATION	UNP P43529
K	13	ILE	THR	ENGINEERED MUTATION	UNP P43529
L	13	ILE	THR	ENGINEERED MUTATION	UNP P43529
M	13	ILE	THR	ENGINEERED MUTATION	UNP P43529
N	13	ILE	THR	ENGINEERED MUTATION	UNP P43529
O	13	ILE	THR	ENGINEERED MUTATION	UNP P43529
P	13	ILE	THR	ENGINEERED MUTATION	UNP P43529
Q	13	ILE	THR	ENGINEERED MUTATION	UNP P43529
R	13	ILE	THR	ENGINEERED MUTATION	UNP P43529
S	13	ILE	THR	ENGINEERED MUTATION	UNP P43529
T	13	ILE	THR	ENGINEERED MUTATION	UNP P43529

- Molecule 2 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	Q	1	Total	Na	0	0
			1	1		
2	E	1	Total	Na	0	0
			1	1		
2	B	1	Total	Na	0	0
			1	1		

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	C	1	Total	Na	0	0
			1	1		
2	R	1	Total	Na	0	0
			1	1		
2	L	1	Total	Na	0	0
			1	1		
2	F	1	Total	Na	0	0
			1	1		
2	M	1	Total	Na	0	0
			1	1		

- Molecule 3 is ACETATE ION (three-letter code: ACT) (formula: C₂H₃O₂).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	N	1	Total	C	O	0	0
			4	2	2		
3	Q	1	Total	C	O	0	0
			4	2	2		

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	D	6	Total	O	0	0
			6	6		
4	E	21	Total	O	0	0
			21	21		

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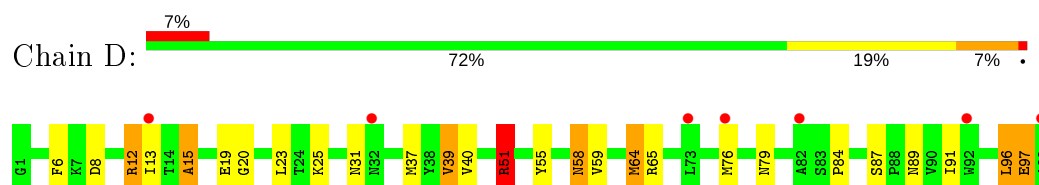
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	F	34	Total 34	O 34	0	0
4	G	25	Total 25	O 25	0	0
4	H	17	Total 17	O 17	0	0
4	A	9	Total 9	O 9	0	0
4	B	24	Total 24	O 24	0	0
4	C	29	Total 29	O 29	0	0
4	I	25	Total 25	O 25	0	0
4	J	17	Total 17	O 17	0	0
4	K	2	Total 2	O 2	0	0
4	L	16	Total 16	O 16	0	0
4	M	33	Total 33	O 33	0	0
4	N	29	Total 29	O 29	0	0
4	O	11	Total 11	O 11	0	0
4	P	3	Total 3	O 3	0	0
4	Q	13	Total 13	O 13	0	0
4	R	33	Total 33	O 33	0	0
4	S	34	Total 34	O 34	0	0
4	T	14	Total 14	O 14	0	0

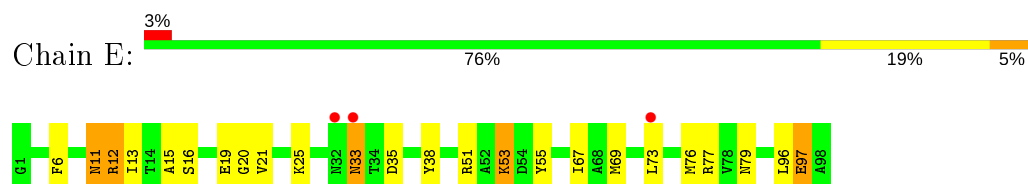
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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.

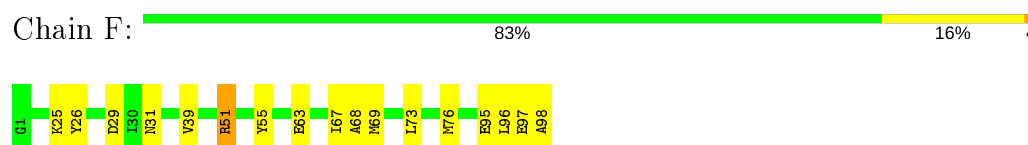
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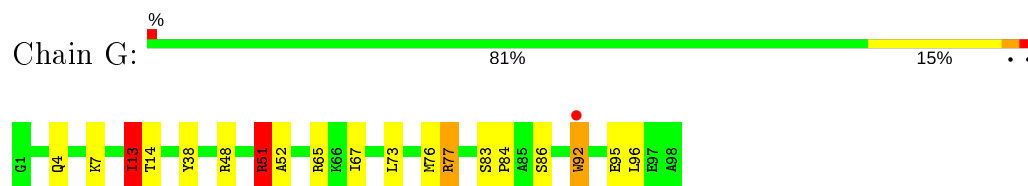
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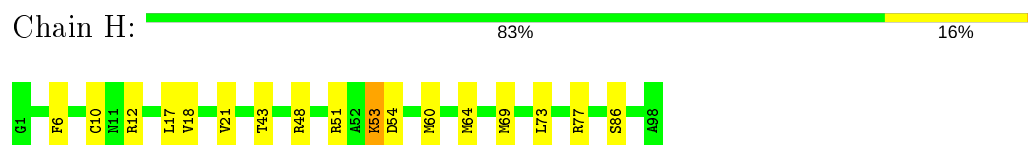
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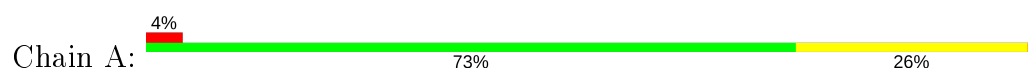
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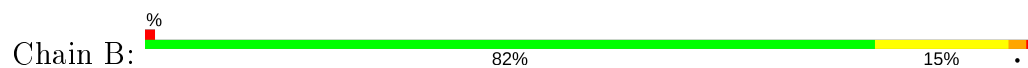
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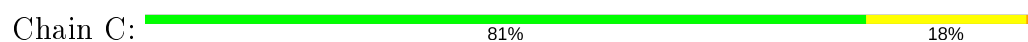
- Molecule 1: Heat-labile enterotoxin IIB, B chain



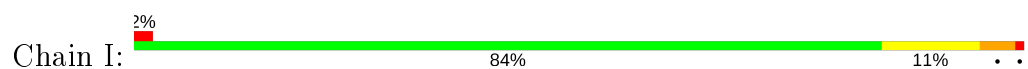
- Molecule 1: Heat-labile enterotoxin IIB, B chain



- Molecule 1: Heat-labile enterotoxin IIB, B chain



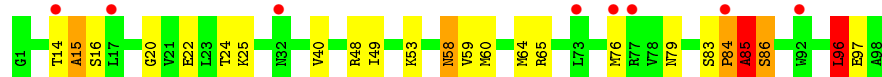
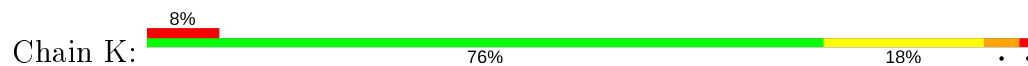
- Molecule 1: Heat-labile enterotoxin IIB, B chain



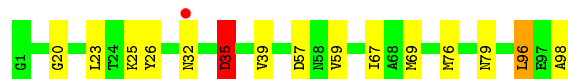
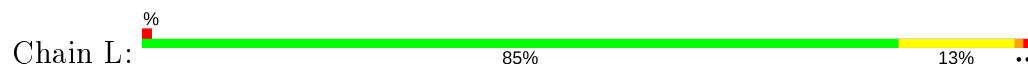
- Molecule 1: Heat-labile enterotoxin IIB, B chain



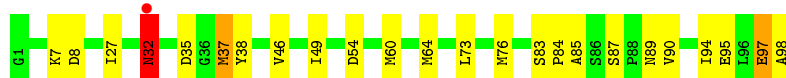
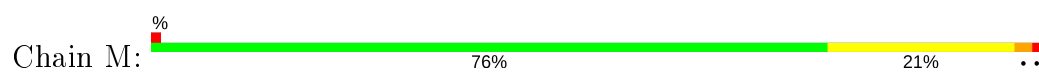
- Molecule 1: Heat-labile enterotoxin IIB, B chain



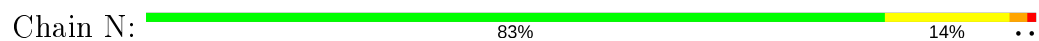
- Molecule 1: Heat-labile enterotoxin IIB, B chain



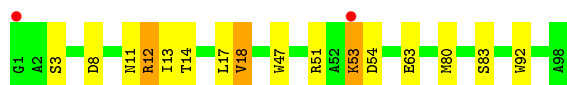
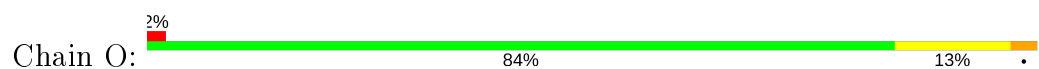
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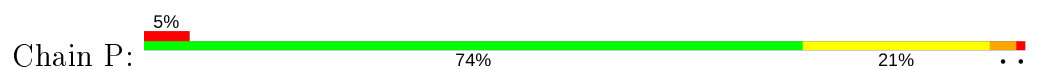
- Molecule 1: Heat-labile enterotoxin IIB, B chain



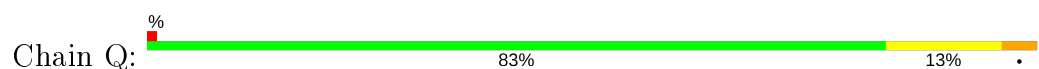
- Molecule 1: Heat-labile enterotoxin IIB, B chain



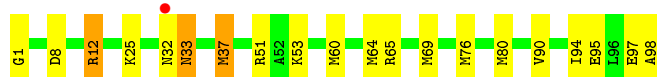
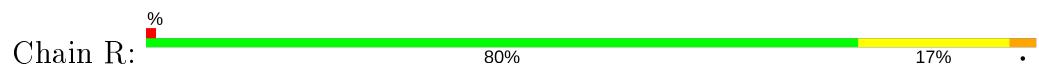
- Molecule 1: Heat-labile enterotoxin IIB, B chain



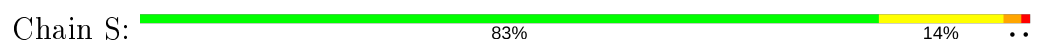
- Molecule 1: Heat-labile enterotoxin IIB, B chain



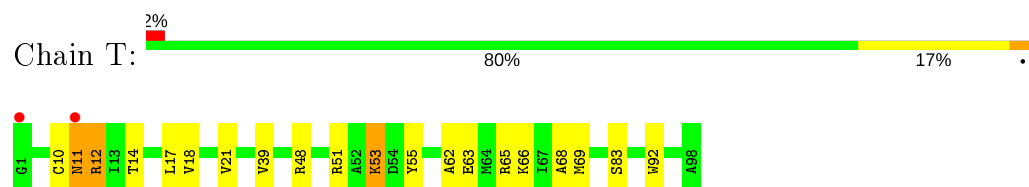
- Molecule 1: Heat-labile enterotoxin IIB, B chain



- Molecule 1: Heat-labile enterotoxin IIB, B chain



- Molecule 1: Heat-labile enterotoxin IIB, B chain



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	119.31Å 119.98Å 142.45Å 90.00° 90.05° 90.00°	Depositor
Resolution (Å)	45.74 – 1.50 45.75 – 1.50	Depositor EDS
% Data completeness (in resolution range)	97.9 (45.74-1.50) 97.6 (45.75-1.50)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	0.04	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.40 (at 1.50Å)	Xtriage
Refinement program	REFMAC 5.5.0088	Depositor
R, R_{free}	0.223 , 0.259 0.220 , 0.254	Depositor DCC
R_{free} test set	15748 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å ²)	22.3	Xtriage
Anisotropy	0.041	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 19.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.032 for k,h,-l 0.029 for -k,-h,-l 0.477 for -h,-k,l	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	15396	wwPDB-VP
Average B, all atoms (Å ²)	24.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.55% 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 ⓘ

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

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	1.09	0/752	1.02	2/1018 (0.2%)
1	B	1.22	0/771	1.07	1/1042 (0.1%)
1	C	1.35	3/760 (0.4%)	1.23	4/1028 (0.4%)
1	D	1.11	2/768 (0.3%)	1.03	4/1039 (0.4%)
1	E	1.27	2/752 (0.3%)	1.21	6/1018 (0.6%)
1	F	1.38	4/760 (0.5%)	1.22	1/1028 (0.1%)
1	G	1.41	5/760 (0.7%)	1.76	10/1028 (1.0%)
1	H	1.28	4/760 (0.5%)	1.20	2/1028 (0.2%)
1	I	1.63	9/760 (1.2%)	1.77	4/1028 (0.4%)
1	J	1.23	2/760 (0.3%)	1.23	6/1028 (0.6%)
1	K	1.11	0/752	1.06	3/1018 (0.3%)
1	L	1.21	2/760 (0.3%)	1.15	4/1029 (0.4%)
1	M	1.29	4/776 (0.5%)	1.32	5/1048 (0.5%)
1	N	1.40	6/760 (0.8%)	1.58	10/1028 (1.0%)
1	O	1.28	2/746 (0.3%)	1.16	2/1011 (0.2%)
1	P	1.08	0/760	1.04	2/1028 (0.2%)
1	Q	1.20	3/760 (0.4%)	1.17	5/1029 (0.5%)
1	R	1.26	2/768 (0.3%)	1.24	8/1038 (0.8%)
1	S	1.41	2/760 (0.3%)	1.30	6/1028 (0.6%)
1	T	1.24	1/760 (0.1%)	1.23	6/1028 (0.6%)
All	All	1.28	53/15205 (0.3%)	1.27	91/20570 (0.4%)

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	K	0	2
1	T	0	1
All	All	0	3

The worst 5 of 53 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	I	92	TRP	CB-CG	-18.96	1.16	1.50
1	G	51	ARG	CG-CD	10.58	1.78	1.51
1	I	51	ARG	CG-CD	9.13	1.74	1.51
1	M	35	ASP	CB-CG	-8.99	1.32	1.51
1	G	51	ARG	CZ-NH1	8.54	1.44	1.33

The worst 5 of 91 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	I	51	ARG	NE-CZ-NH2	-32.92	103.84	120.30
1	G	51	ARG	NE-CZ-NH2	-30.16	105.22	120.30
1	G	51	ARG	NE-CZ-NH1	21.37	130.99	120.30
1	I	51	ARG	NE-CZ-NH1	21.26	130.93	120.30
1	N	48	ARG	NE-CZ-NH1	19.71	130.16	120.30

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	K	83	SER	Peptide
1	K	85	ALA	Peptide
1	T	11	ASN	Peptide

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	741	0	733	22	0
1	B	760	0	753	21	0
1	C	749	0	741	10	0
1	D	757	0	746	23	0
1	E	741	0	733	25	0
1	F	749	0	741	16	0
1	G	749	0	741	18	1
1	H	749	0	741	14	0
1	I	749	0	741	18	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	J	749	0	741	16	0
1	K	741	0	733	24	0
1	L	749	0	743	11	0
1	M	765	0	757	14	0
1	N	749	0	741	13	0
1	O	735	0	722	13	0
1	P	749	0	741	20	0
1	Q	749	0	736	15	0
1	R	757	0	749	14	1
1	S	749	0	741	10	0
1	T	749	0	741	22	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	E	1	0	0	0	0
2	F	1	0	0	0	0
2	L	1	0	0	0	0
2	M	1	0	0	0	0
2	Q	1	0	0	0	0
2	R	1	0	0	0	0
3	N	4	0	3	4	0
3	Q	4	0	3	3	0
4	A	9	0	0	2	0
4	B	24	0	0	1	0
4	C	29	0	0	2	0
4	D	6	0	0	2	0
4	E	21	0	0	0	0
4	F	34	0	0	3	0
4	G	25	0	0	1	0
4	H	17	0	0	0	0
4	I	25	0	0	1	0
4	J	17	0	0	0	0
4	K	2	0	0	0	0
4	L	16	0	0	3	0
4	M	33	0	0	3	0
4	N	29	0	0	3	0
4	O	11	0	0	0	0
4	P	3	0	0	0	0
4	Q	13	0	0	3	0
4	R	33	0	0	4	0
4	S	34	0	0	4	0
4	T	14	0	0	0	0
All	All	15396	0	14821	299	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 10.

The worst 5 of 299 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:I:51:ARG:CG	1:I:51:ARG:CD	1.74	1.62
1:G:51:ARG:CG	1:G:51:ARG:CD	1.78	1.59
1:T:11:ASN:CB	1:T:12:ARG:HA	1.54	1.24
1:H:53:LYS:HD2	1:H:53:LYS:N	1.55	1.20
1:H:53:LYS:H	1:H:53:LYS:CD	1.56	1.16

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:G:4:GLN:CG	1:R:12:ARG:NH1[2_655]	1.63	0.57

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	96/98 (98%)	93 (97%)	2 (2%)	1 (1%)	15	3
1	B	98/98 (100%)	98 (100%)	0	0	100	100
1	C	97/98 (99%)	92 (95%)	4 (4%)	1 (1%)	15	3
1	D	98/98 (100%)	97 (99%)	0	1 (1%)	15	3
1	E	96/98 (98%)	95 (99%)	1 (1%)	0	100	100
1	F	97/98 (99%)	92 (95%)	5 (5%)	0	100	100
1	G	97/98 (99%)	97 (100%)	0	0	100	100
1	H	97/98 (99%)	94 (97%)	3 (3%)	0	100	100
1	I	97/98 (99%)	97 (100%)	0	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	J	97/98 (99%)	94 (97%)	3 (3%)	0	100	100
1	K	96/98 (98%)	90 (94%)	3 (3%)	3 (3%)	4	0
1	L	97/98 (99%)	96 (99%)	0	1 (1%)	15	3
1	M	99/98 (101%)	93 (94%)	5 (5%)	1 (1%)	15	3
1	N	97/98 (99%)	96 (99%)	1 (1%)	0	100	100
1	O	96/98 (98%)	94 (98%)	1 (1%)	1 (1%)	15	3
1	P	97/98 (99%)	94 (97%)	1 (1%)	2 (2%)	7	1
1	Q	97/98 (99%)	97 (100%)	0	0	100	100
1	R	98/98 (100%)	93 (95%)	4 (4%)	1 (1%)	15	3
1	S	97/98 (99%)	97 (100%)	0	0	100	100
1	T	97/98 (99%)	94 (97%)	3 (3%)	0	100	100
All	All	1941/1960 (99%)	1893 (98%)	36 (2%)	12 (1%)	25	7

5 of 12 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	85	ALA
1	C	32	ASN
1	K	15	ALA
1	P	15	ALA
1	R	32	ASN

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	81/81 (100%)	79 (98%)	2 (2%)	47	18
1	B	83/81 (102%)	79 (95%)	4 (5%)	25	4
1	C	82/81 (101%)	80 (98%)	2 (2%)	49	19
1	D	83/81 (102%)	76 (92%)	7 (8%)	11	1
1	E	81/81 (100%)	74 (91%)	7 (9%)	10	0

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	F	82/81 (101%)	82 (100%)	0	100	100
1	G	82/81 (101%)	78 (95%)	4 (5%)	25	4
1	H	82/81 (101%)	78 (95%)	4 (5%)	25	4
1	I	82/81 (101%)	78 (95%)	4 (5%)	25	4
1	J	82/81 (101%)	76 (93%)	6 (7%)	14	1
1	K	81/81 (100%)	73 (90%)	8 (10%)	8	0
1	L	82/81 (101%)	80 (98%)	2 (2%)	49	19
1	M	84/81 (104%)	79 (94%)	5 (6%)	19	2
1	N	82/81 (101%)	81 (99%)	1 (1%)	71	48
1	O	80/81 (99%)	76 (95%)	4 (5%)	24	4
1	P	82/81 (101%)	77 (94%)	5 (6%)	18	2
1	Q	82/81 (101%)	78 (95%)	4 (5%)	25	4
1	R	83/81 (102%)	79 (95%)	4 (5%)	25	4
1	S	82/81 (101%)	78 (95%)	4 (5%)	25	4
1	T	82/81 (101%)	80 (98%)	2 (2%)	49	19
All	All	1640/1620 (101%)	1561 (95%)	79 (5%)	26	4

5 of 79 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	J	18	VAL
1	K	58	ASN
1	S	16	SER
1	J	43	THR
1	K	16	SER

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 47 such sidechains are listed below:

Mol	Chain	Res	Type
1	I	9	ASN
1	L	79	ASN
1	R	33	ASN
1	K	58	ASN
1	M	4	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 carbohydrates in this entry.

5.6 Ligand geometry ⓘ

Of 10 ligands modelled in this entry, 8 are monoatomic - leaving 2 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or 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 length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
3	ACT	N	101	-	1,3,3	8.58	1 (100%)	0,3,3	0.00	-
3	ACT	Q	102	-	1,3,3	3.77	1 (100%)	0,3,3	0.00	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	N	101	ACT	CH3-C	8.58	1.59	1.48
3	Q	102	ACT	CH3-C	3.77	1.53	1.48

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

2 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	N	101	ACT	4	0
3	Q	102	ACT	3	0

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, 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	98/98 (100%)	0.39	4 (4%) 37 41	18, 30, 48, 57	1 (1%)
1	B	98/98 (100%)	-0.14	1 (1%) 82 85	15, 22, 36, 44	0
1	C	98/98 (100%)	-0.23	0 100 100	13, 19, 32, 42	0
1	D	98/98 (100%)	0.38	7 (7%) 16 17	18, 30, 48, 53	1 (1%)
1	E	98/98 (100%)	-0.09	3 (3%) 49 54	14, 22, 35, 45	0
1	F	98/98 (100%)	-0.21	0 100 100	13, 19, 30, 40	0
1	G	98/98 (100%)	-0.08	1 (1%) 82 85	14, 21, 35, 42	0
1	H	98/98 (100%)	-0.16	0 100 100	13, 22, 33, 38	0
1	I	98/98 (100%)	-0.03	2 (2%) 65 70	13, 20, 36, 42	0
1	J	98/98 (100%)	-0.09	0 100 100	13, 22, 33, 37	0
1	K	98/98 (100%)	0.67	8 (8%) 11 12	20, 35, 50, 56	1 (1%)
1	L	98/98 (100%)	-0.00	1 (1%) 82 85	16, 24, 37, 45	0
1	M	98/98 (100%)	-0.18	1 (1%) 82 85	13, 19, 31, 46	0
1	N	98/98 (100%)	-0.25	0 100 100	12, 18, 30, 34	0
1	O	98/98 (100%)	0.18	2 (2%) 65 70	15, 26, 39, 46	0
1	P	98/98 (100%)	0.67	5 (5%) 28 30	21, 34, 49, 53	1 (1%)
1	Q	98/98 (100%)	-0.03	1 (1%) 82 85	16, 24, 36, 43	0
1	R	98/98 (100%)	-0.22	1 (1%) 82 85	14, 19, 31, 44	0
1	S	98/98 (100%)	-0.24	0 100 100	13, 18, 30, 33	0
1	T	98/98 (100%)	0.22	2 (2%) 65 70	14, 27, 41, 46	0
All	All	1960/1960 (100%)	0.03	39 (1%) 65 70	12, 23, 41, 57	4 (0%)

The worst 5 of 39 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	G	92	TRP	5.3
1	P	14	THR	4.0
1	Q	32	ASN	4.0
1	K	76	MET	3.9
1	K	14	THR	3.8

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. 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	B-factors(\AA^2)	Q<0.9
3	ACT	N	101	4/4	0.91	0.13	24,25,25,28	0
3	ACT	Q	102	4/4	0.93	0.12	28,28,30,31	0
2	NA	B	101	1/1	0.96	0.13	30,30,30,30	0
2	NA	E	101	1/1	0.96	0.05	25,25,25,25	0
2	NA	F	101	1/1	0.98	0.05	23,23,23,23	0
2	NA	L	101	1/1	0.98	0.17	23,23,23,23	0
2	NA	Q	101	1/1	0.99	0.05	23,23,23,23	0
2	NA	C	101	1/1	0.99	0.04	23,23,23,23	0
2	NA	R	101	1/1	0.99	0.06	18,18,18,18	0
2	NA	M	101	1/1	0.99	0.09	18,18,18,18	0

6.5 Other polymers [i](#)

There are no such residues in this entry.