



wwPDB X-ray Structure Validation Summary Report

Sep 6, 2023 – 07:14 AM EDT

PDB ID : 4E75
Title : Structure of LpxD from Acinetobacter baumannii at 2.85Å resolution (P21 form)
Authors : Badger, J.; Chie-Leon, B.; Logan, C.; Sridhar, V.; Sankaran, B.; Zwart, P.H.; Nienaber, V.
Deposited on : 2012-03-16
Resolution : 2.85 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 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 : 4.02b-467
Xtriage (Phenix) : 1.13
EDS : 2.35
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) : 2.35

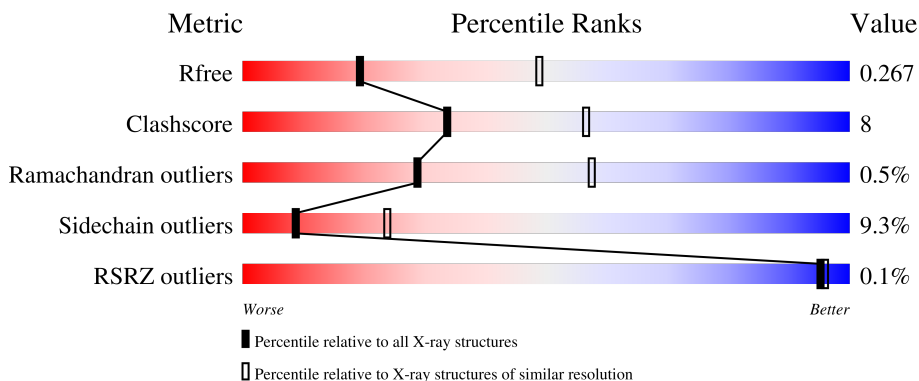
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.85 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	3168 (2.90-2.82)
Clashscore	141614	3438 (2.90-2.82)
Ramachandran outliers	138981	3348 (2.90-2.82)
Sidechain outliers	138945	3351 (2.90-2.82)
RSRZ outliers	127900	3103 (2.90-2.82)

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 $\leq 5\%$. 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	357	
1	B	357	
1	C	357	
1	D	357	
1	E	357	

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Mol	Chain	Length	Quality of chain
1	F	357	 71% 20% 6%

2 Entry composition [i](#)

There is only 1 type of molecule in this entry. The entry contains 15088 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 UDP-3-O-acylglucosamine N-acyltransferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	337	2513	1574	444	487	8	0	0	0
1	B	337	2515	1575	445	487	8	0	0	0
1	C	337	2515	1575	445	487	8	0	0	0
1	D	337	2515	1575	445	487	8	0	0	0
1	E	337	2515	1575	445	487	8	0	0	0
1	F	337	2515	1575	445	487	8	0	0	0

There are 18 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	GLY	-	expression tag	UNP B0VMV2
A	2	GLY	-	expression tag	UNP B0VMV2
A	3	SER	-	expression tag	UNP B0VMV2
B	1	GLY	-	expression tag	UNP B0VMV2
B	2	GLY	-	expression tag	UNP B0VMV2
B	3	SER	-	expression tag	UNP B0VMV2
C	1	GLY	-	expression tag	UNP B0VMV2
C	2	GLY	-	expression tag	UNP B0VMV2
C	3	SER	-	expression tag	UNP B0VMV2
D	1	GLY	-	expression tag	UNP B0VMV2
D	2	GLY	-	expression tag	UNP B0VMV2
D	3	SER	-	expression tag	UNP B0VMV2
E	1	GLY	-	expression tag	UNP B0VMV2
E	2	GLY	-	expression tag	UNP B0VMV2
E	3	SER	-	expression tag	UNP B0VMV2
F	1	GLY	-	expression tag	UNP B0VMV2
F	2	GLY	-	expression tag	UNP B0VMV2

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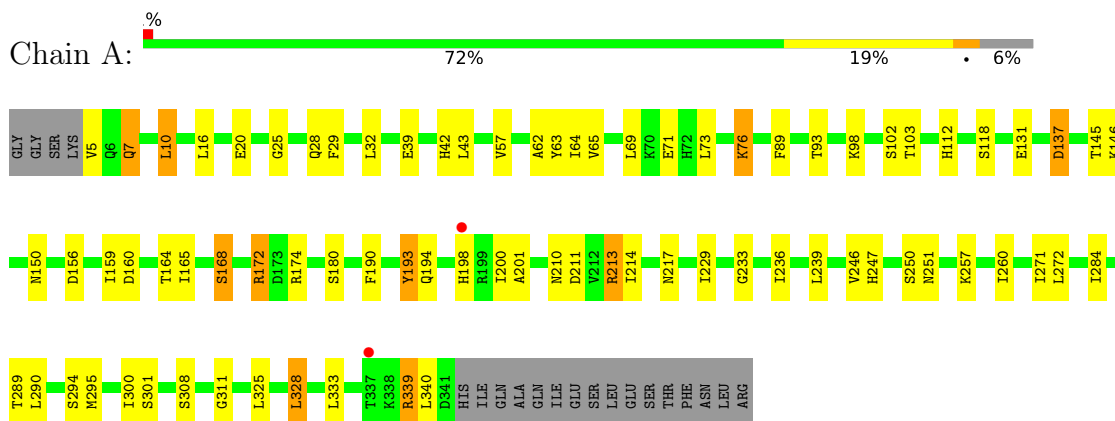
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Chain	Residue	Modelled	Actual	Comment	Reference
F	3	SER	-	expression tag	UNP B0VMV2

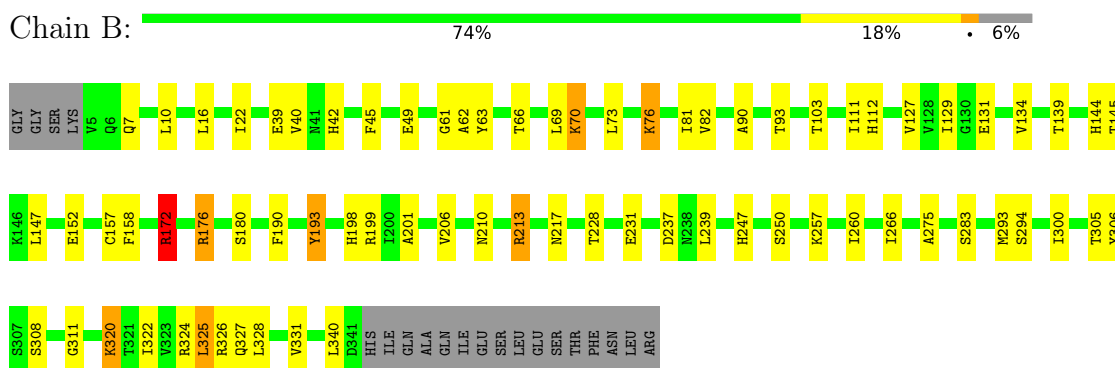
3 Residue-property plots [i](#)

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.

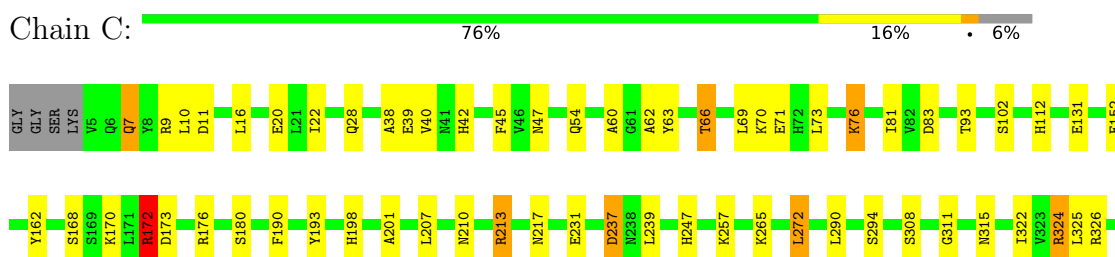
- Molecule 1: UDP-3-O-acylglucosamine N-acyltransferase

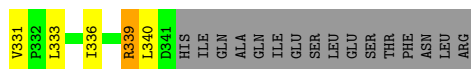


- Molecule 1: UDP-3-O-acylglucosamine N-acyltransferase



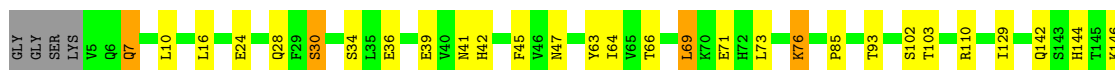
- Molecule 1: UDP-3-O-acylglucosamine N-acyltransferase





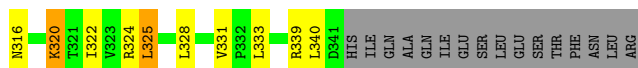
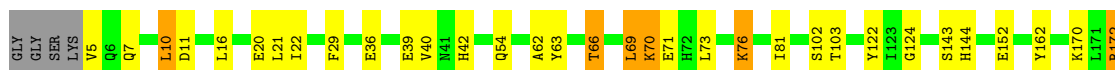
- Molecule 1: UDP-3-O-acylglucosamine N-acyltransferase

Chain D: 74% 18% 6%



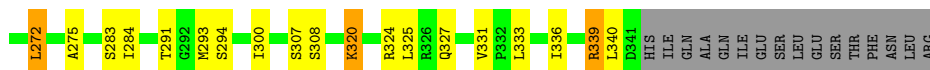
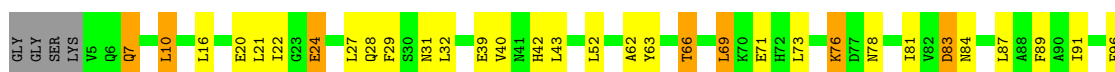
- Molecule 1: UDP-3-O-acylglucosamine N-acyltransferase

Chain E: 73% 18% 6%



- Molecule 1: UDP-3-O-acylglucosamine N-acyltransferase

Chain F: 71% 20% 6%



4 Data and refinement statistics i

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	106.68Å 209.61Å 107.63Å 90.00° 119.23° 90.00°	Depositor
Resolution (Å)	48.15 – 2.85 48.14 – 2.85	Depositor EDS
% Data completeness (in resolution range)	(Not available) (48.15-2.85) 98.1 (48.14-2.85)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.96 (at 2.86Å)	Xtriage
Refinement program	REFMAC 5.5.0072	Depositor
R, R_{free}	0.234 , 0.280 0.223 , 0.267	Depositor DCC
R_{free} test set	4744 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	51.8	Xtriage
Anisotropy	0.102	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.28 , 2.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.070 for -h-l,k,h 0.070 for l,k,-h-l 0.347 for h,-k,-h-l 0.063 for -h-l,-k,l 0.090 for l,-k,h	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	15088	wwPDB-VP
Average B, all atoms (Å ²)	52.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 11.87% 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 [i](#)

5.1 Standard geometry [i](#)

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	0.59	0/2552	0.71	0/3467
1	B	0.59	0/2554	0.71	0/3469
1	C	0.61	0/2554	0.73	1/3469 (0.0%)
1	D	0.59	0/2554	0.69	0/3469
1	E	0.60	0/2554	0.71	0/3469
1	F	0.60	0/2554	0.73	1/3469 (0.0%)
All	All	0.60	0/15322	0.71	2/20812 (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	D	0	1

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	F	272	LEU	CA-CB-CG	5.60	128.18	115.30
1	C	237	ASP	CB-CG-OD2	-5.28	113.55	118.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	D	311	GLY	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	2513	0	2470	49	0
1	B	2515	0	2477	52	0
1	C	2515	0	2477	47	0
1	D	2515	0	2477	49	0
1	E	2515	0	2477	44	0
1	F	2515	0	2477	54	0
All	All	15088	0	14855	253	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 8.

The worst 5 of 253 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:E:193:TYR:CE1	1:E:198:HIS:HB2	2.03	0.94
1:C:152:GLU:HG3	1:C:170:LYS:HE3	1.51	0.93
1:B:190:PHE:HZ	1:C:213:ARG:HD3	1.34	0.90
1:F:66:THR:HG22	1:F:69:LEU:HB2	1.56	0.86
1:F:84:ASN:HD22	1:F:87:LEU:HB3	1.39	0.86

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	335/357 (94%)	318 (95%)	15 (4%)	2 (1%)	25 53

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	B	335/357 (94%)	313 (93%)	21 (6%)	1 (0%)	41 68
1	C	335/357 (94%)	310 (92%)	24 (7%)	1 (0%)	41 68
1	D	335/357 (94%)	311 (93%)	21 (6%)	3 (1%)	17 43
1	E	335/357 (94%)	320 (96%)	14 (4%)	1 (0%)	41 68
1	F	335/357 (94%)	314 (94%)	18 (5%)	3 (1%)	17 43
All	All	2010/2142 (94%)	1886 (94%)	113 (6%)	11 (0%)	29 57

5 of 11 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	172	ARG
1	D	24	GLU
1	F	172	ARG
1	A	25	GLY
1	A	98	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	267/295 (90%)	240 (90%)	27 (10%)	7 20
1	B	268/295 (91%)	248 (92%)	20 (8%)	13 34
1	C	268/295 (91%)	244 (91%)	24 (9%)	9 25
1	D	268/295 (91%)	244 (91%)	24 (9%)	9 25
1	E	268/295 (91%)	242 (90%)	26 (10%)	8 22
1	F	268/295 (91%)	239 (89%)	29 (11%)	6 17
All	All	1607/1770 (91%)	1457 (91%)	150 (9%)	9 24

5 of 150 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	E	283	SER

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Mol	Chain	Res	Type
1	F	283	SER
1	E	339	ARG
1	F	76	LYS
1	C	10	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 35 such sidechains are listed below:

Mol	Chain	Res	Type
1	E	251	ASN
1	F	7	GLN
1	F	54	GLN
1	C	217	ASN
1	C	42	HIS

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 monosaccharides 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 [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	337/357 (94%)	-0.27	2 (0%) 89 89	26, 52, 82, 120	0
1	B	337/357 (94%)	-0.26	0 100 100	33, 48, 79, 116	0
1	C	337/357 (94%)	-0.24	0 100 100	31, 48, 74, 114	0
1	D	337/357 (94%)	-0.21	0 100 100	32, 51, 83, 124	0
1	E	337/357 (94%)	-0.27	0 100 100	29, 47, 75, 115	0
1	F	337/357 (94%)	-0.29	0 100 100	28, 48, 76, 117	0
All	All	2022/2142 (94%)	-0.26	2 (0%) 95 96	26, 49, 79, 124	0

All (2) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	337	THR	2.3
1	A	198	HIS	2.1

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 monosaccharides in this entry.

6.4 Ligands [i](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.