



Full wwPDB X-ray Structure Validation Report ⓘ

Nov 29, 2021 – 06:07 PM JST

PDB ID : 7EWT
Title : The crystal structure of Lysophospholipid acyltransferase LPCAT3 (MO-BAT5) in its monomeric and apo form
Authors : Zhang, Q.; Yao, D.; Rao, B.; Li, S.; Jian, L.; Chen, Y.; Hu, K.; Xia, Y.; Cao, Y.
Deposited on : 2021-05-26
Resolution : 3.40 Å(reported)

This is a Full wwPDB X-ray 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/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
Xtriage (Phenix) : 1.13
EDS : 2.23.2
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) : 2.23.2

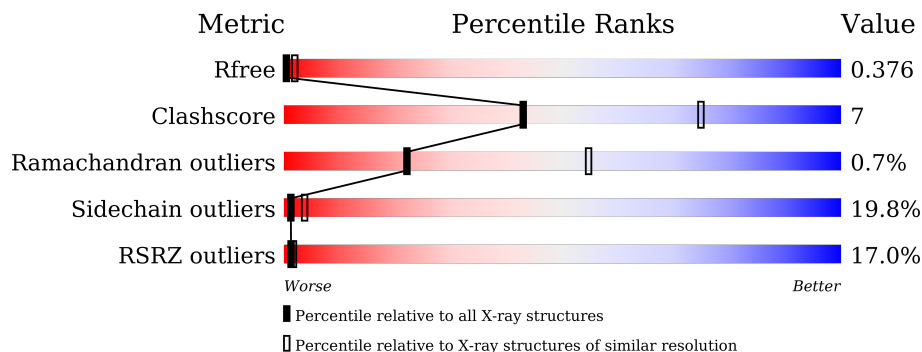
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.40 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	1026 (3.48-3.32)
Clashscore	141614	1055 (3.48-3.32)
Ramachandran outliers	138981	1038 (3.48-3.32)
Sidechain outliers	138945	1038 (3.48-3.32)
RSRZ outliers	127900	2173 (3.50-3.30)

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	448	

2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 3430 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.

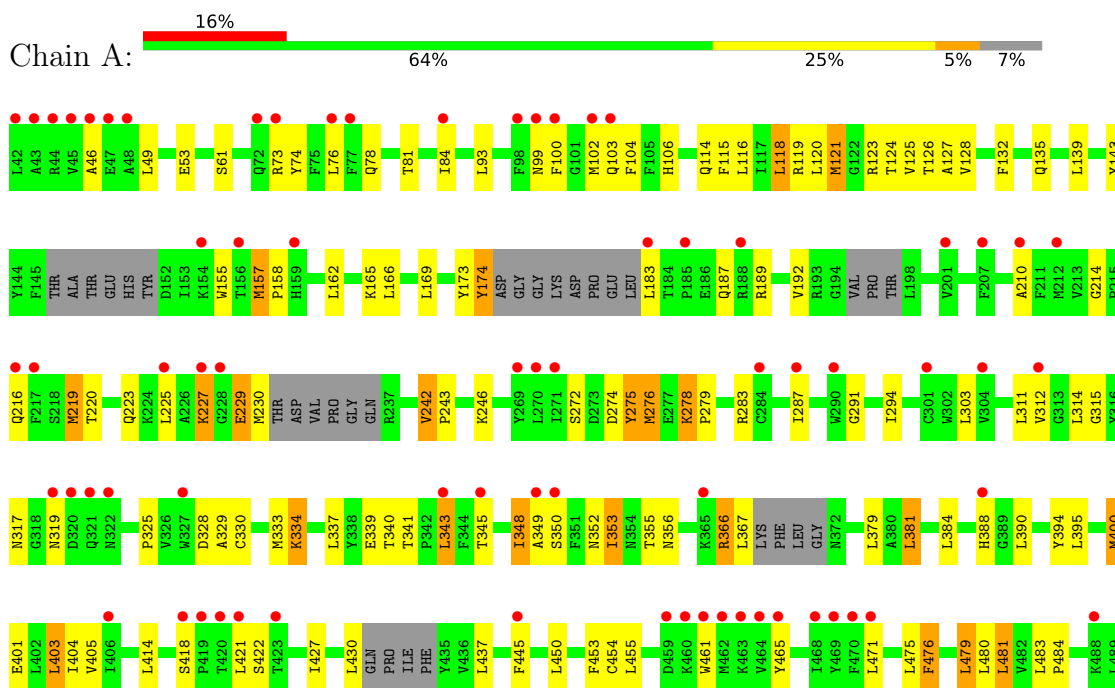
- Molecule 1 is a protein called Lysophospholipid acyltransferase 5.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	417	3430	2306	535	566	23	0	0	0

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: Lysophospholipid acyltransferase 5



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	76.79Å 82.26Å 116.92Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.65 – 3.40 47.65 – 3.40	Depositor EDS
% Data completeness (in resolution range)	99.8 (47.65-3.40) 99.8 (47.65-3.40)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.23 (at 3.40Å)	Xtrriage
Refinement program	BUSTER 2.10.3	Depositor
R, R_{free}	0.343 , 0.345 0.351 , 0.376	Depositor DCC
R_{free} test set	553 reflections (5.22%)	wwPDB-VP
Wilson B-factor (Å ²)	159.7	Xtrriage
Anisotropy	0.080	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 124.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.84	EDS
Total number of atoms	3430	wwPDB-VP
Average B, all atoms (Å ²)	158.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.65% 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	0.46	0/3529	0.64	0/4788

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

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	3430	0	3473	47	0
All	All	3430	0	3473	47	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 7.

All (47) 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:103:GLN:HB2	1:A:155:TRP:HB2	1.58	0.85
1:A:350:SER:HB3	1:A:353:ILE:HA	1.74	0.70
1:A:275:TYR:HA	1:A:278:LYS:HD2	1.79	0.65
1:A:339:GLU:HG3	1:A:340:THR:HG23	1.81	0.60
1:A:479:LEU:O	1:A:483:LEU:HB2	2.04	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:243:PRO:HA	1:A:246:LYS:HD2	1.88	0.56
1:A:139:LEU:HG	1:A:143:TYR:HE2	1.70	0.55
1:A:121:MET:HB3	1:A:127:ALA:HB2	1.88	0.55
1:A:381:LEU:HA	1:A:384:LEU:HD12	1.89	0.55
1:A:291:GLY:HA2	1:A:294:ILE:HG22	1.88	0.54
1:A:272:SER:O	1:A:276:MET:HB2	2.08	0.54
1:A:114:GLN:HG2	1:A:166:LEU:HB3	1.91	0.53
1:A:317:ASN:HA	1:A:329:ALA:HB2	1.93	0.51
1:A:319:ASN:HA	1:A:325:PRO:HA	1.93	0.51
1:A:350:SER:HB3	1:A:353:ILE:HG23	1.95	0.49
1:A:225:LEU:HA	1:A:229:GLU:HA	1.94	0.48
1:A:210:ALA:HA	1:A:214:GLY:HA3	1.96	0.48
1:A:315:GLY:HA2	1:A:330:CYS:SG	2.54	0.47
1:A:81:THR:HA	1:A:84:ILE:HD12	1.98	0.46
1:A:225:LEU:HD11	1:A:312:VAL:HG12	1.98	0.46
1:A:348:ILE:HG21	1:A:405:VAL:HG21	1.98	0.46
1:A:427:ILE:HD11	1:A:430:LEU:HD12	1.97	0.46
1:A:162:LEU:HA	1:A:165:LYS:HB2	1.98	0.46
1:A:227:LYS:HE3	1:A:227:LYS:HB2	1.38	0.46
1:A:317:ASN:CA	1:A:329:ALA:HB2	2.46	0.46
1:A:390:LEU:HD12	1:A:394:TYR:HE2	1.80	0.46
1:A:103:GLN:HA	1:A:106:HIS:HD2	1.82	0.45
1:A:124:THR:O	1:A:174:TYR:OH	2.29	0.45
1:A:343:LEU:H	1:A:343:LEU:HG	1.48	0.45
1:A:115:PHE:HA	1:A:118:LEU:HB2	1.98	0.44
1:A:157:MET:HB3	1:A:158:PRO:HD3	2.00	0.44
1:A:225:LEU:HD22	1:A:314:LEU:HD13	2.00	0.44
1:A:348:ILE:O	1:A:349:ALA:C	2.55	0.43
1:A:334:LYS:HB2	1:A:334:LYS:HE3	1.44	0.43
1:A:169:LEU:HD12	1:A:219:MET:HG3	2.01	0.43
1:A:345:THR:O	1:A:349:ALA:HB2	2.18	0.43
1:A:46:ALA:HB1	1:A:53:GLU:HA	2.02	0.42
1:A:366:ARG:HE	1:A:366:ARG:HB3	1.48	0.42
1:A:242:VAL:HG13	1:A:243:PRO:HD3	2.02	0.42
1:A:400:MET:SD	1:A:401:GLU:N	2.94	0.41
1:A:183:LEU:HD22	1:A:187:GLN:HB3	2.03	0.41
1:A:61:SER:HB2	1:A:99:ASN:HD21	1.86	0.41
1:A:76:LEU:C	1:A:78:GLN:H	2.22	0.41
1:A:173:TYR:HA	1:A:192:VAL:HG22	2.03	0.41
1:A:481:LEU:O	1:A:484:PRO:HD2	2.21	0.41
1:A:403:LEU:HG	1:A:476:PHE:CZ	2.57	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:350:SER:CB	1:A:353:ILE:HG23	2.51	0.40

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	403/448 (90%)	369 (92%)	31 (8%)	3 (1%)	22 55

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	454	CYS
1	A	279	PRO
1	A	453	PHE

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	369/395 (93%)	296 (80%)	73 (20%)	1 4

All (73) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	49	LEU
1	A	73	ARG
1	A	74	TYR
1	A	93	LEU
1	A	100	PHE
1	A	102	MET
1	A	104	PHE
1	A	116	LEU
1	A	118	LEU
1	A	119	ARG
1	A	120	LEU
1	A	121	MET
1	A	123	ARG
1	A	125	VAL
1	A	126	THR
1	A	128	VAL
1	A	132	PHE
1	A	135	GLN
1	A	157	MET
1	A	174	TYR
1	A	189	ARG
1	A	216	GLN
1	A	219	MET
1	A	220	THR
1	A	223	GLN
1	A	227	LYS
1	A	229	GLU
1	A	230	MET
1	A	242	VAL
1	A	274	ASP
1	A	275	TYR
1	A	276	MET
1	A	278	LYS
1	A	283	ARG
1	A	287	ILE
1	A	303	LEU
1	A	311	LEU
1	A	328	ASP
1	A	333	MET
1	A	334	LYS
1	A	337	LEU
1	A	341	THR
1	A	343	LEU

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Mol	Chain	Res	Type
1	A	348	ILE
1	A	352	ASN
1	A	353	ILE
1	A	355	THR
1	A	356	ASN
1	A	366	ARG
1	A	367	LEU
1	A	379	LEU
1	A	381	LEU
1	A	388	HIS
1	A	395	LEU
1	A	400	MET
1	A	403	LEU
1	A	404	ILE
1	A	414	LEU
1	A	418	SER
1	A	421	LEU
1	A	422	SER
1	A	437	LEU
1	A	445	PHE
1	A	450	LEU
1	A	455	LEU
1	A	461	TRP
1	A	465	TYR
1	A	471	LEU
1	A	475	LEU
1	A	476	PHE
1	A	479	LEU
1	A	480	LEU
1	A	481	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	99	ASN
1	A	216	GLN
1	A	388	HIS

5.3.3 RNA

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

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	417/448 (93%)	0.95	71 (17%) 1 2	119, 156, 196, 228	0

All (71) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	183	LEU	8.9
1	A	76	LEU	7.8
1	A	321	GLN	6.0
1	A	470	PHE	5.9
1	A	418	SER	5.1
1	A	350	SER	4.9
1	A	72	GLN	4.9
1	A	459	ASP	4.7
1	A	103	GLN	4.5
1	A	99	ASN	4.5
1	A	423	THR	4.4
1	A	471	LEU	4.1
1	A	210	ALA	3.9
1	A	44	ARG	3.8
1	A	460	LYS	3.8
1	A	420	THR	3.8
1	A	322	ASN	3.8
1	A	42	LEU	3.8
1	A	270	LEU	3.7
1	A	271	ILE	3.7
1	A	98	PHE	3.6
1	A	421	LEU	3.6
1	A	465	TYR	3.5
1	A	488	LYS	3.5
1	A	45	VAL	3.4
1	A	365	LYS	3.4
1	A	212	MET	3.4

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Mol	Chain	Res	Type	RSRZ
1	A	217	PHE	3.3
1	A	228	GLY	3.3
1	A	100	PHE	3.3
1	A	284	CYS	3.2
1	A	312	VAL	3.1
1	A	319	ASN	3.1
1	A	227	LYS	3.1
1	A	84	ILE	3.1
1	A	320	ASP	3.1
1	A	156	THR	3.0
1	A	349	ALA	3.0
1	A	43	ALA	2.8
1	A	48	ALA	2.8
1	A	287	ILE	2.8
1	A	304	VAL	2.8
1	A	216	GLN	2.7
1	A	185	PRO	2.7
1	A	464	VAL	2.7
1	A	188	ARG	2.6
1	A	461	TRP	2.6
1	A	207	PHE	2.6
1	A	102	MET	2.6
1	A	343	LEU	2.6
1	A	47	GLU	2.5
1	A	73	ARG	2.5
1	A	419	PRO	2.4
1	A	269	TYR	2.4
1	A	46	ALA	2.4
1	A	290	TRP	2.3
1	A	469	TYR	2.3
1	A	225	LEU	2.3
1	A	463	LYS	2.3
1	A	406	ILE	2.2
1	A	388	HIS	2.2
1	A	445	PHE	2.2
1	A	301	CYS	2.2
1	A	77	PHE	2.1
1	A	345	THR	2.1
1	A	468	ILE	2.1
1	A	201	VAL	2.0
1	A	327	TRP	2.0
1	A	154	LYS	2.0

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Mol	Chain	Res	Type	RSRZ
1	A	159	HIS	2.0
1	A	462	MET	2.0

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.