WORLDWIDE PDB
PROTEIN DATA BANK

Full wwPDB X-ray Structure Validation Report ⓘ

May 20, 2025 – 02:25 AM EDT

PDB ID	:	3CX9 / pdb_00003cx9
Title	:	Crystal Structure of Human serum albumin complexed with Myristic acid and lysophosphatidylethanolamine
Authors	:	Guo, S.; Yang, F.; Chen, L.; Bian, C.; Huang, M.
Deposited on	:	2008-04-24
Resolution	:	2.80 Å(reported)

The following versions of software and data (see references ⓘ) were used in the production of this report:

|		
MolProbity	:	4-5-2 with Phenix2.0rc1
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0rc1
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.006 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.43.1

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 2.80 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.

■ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution
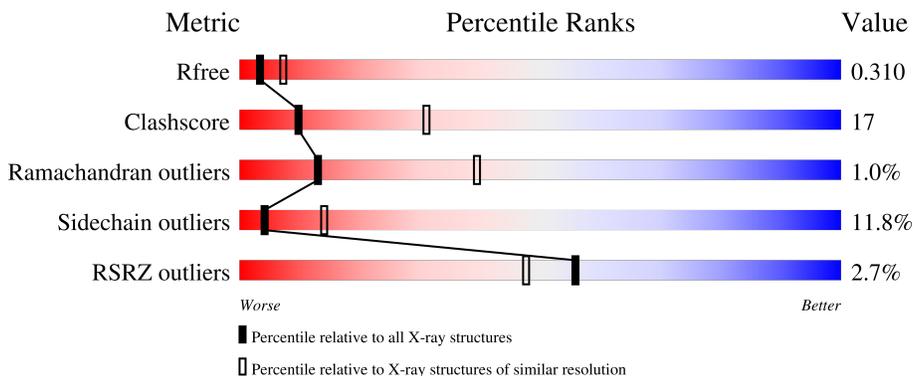
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	3657 (2.80-2.80)
Clashscore	180529	4123 (2.80-2.80)
Ramachandran outliers	177936	4071 (2.80-2.80)
Sidechain outliers	177891	4073 (2.80-2.80)
RSRZ outliers	164620	3659 (2.80-2.80)

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 <=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	582	3% 69% 26%

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
2	MYR	A	1004	-	-	X	-

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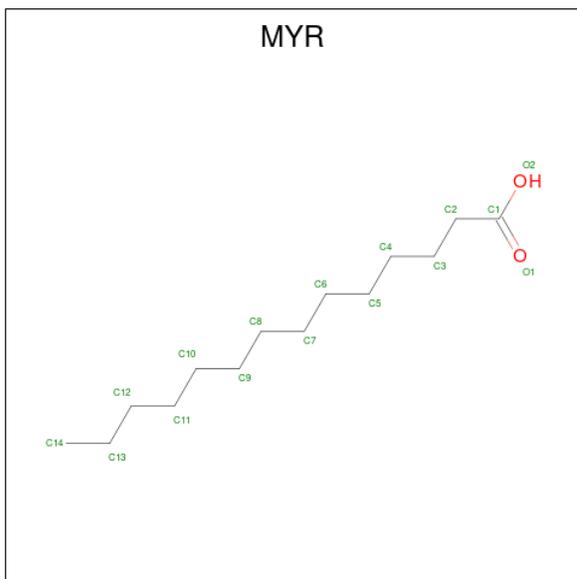| Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	LPX	A	2001	-	-	X	-

2   Entry composition ⓘ

There are 3 unique types of molecules in this entry. The entry contains 4591 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 Serum albumin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	582	Total 4493	C 2845	N 756	O 851	S 41	0	0	0

- Molecule 2 is MYRISTIC ACID (CCD ID: MYR) (formula: $C_{14}H_{28}O_2$).

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total 9	C 9		0	0
2	A	1	Total 16	C 14	O 2	0	0
2	A	1	Total 11	C 11		0	0
2	A	1	Total 16	C 14	O 2	0	0
2	A	1	Total 16	C 14	O 2	0	0

- Molecule 3 is (2S)-3-{[(R)-(2-aminoethoxy)(hydroxy)phosphoryl]oxy}-2-hydroxypropyl hexadecanoate (CCD ID: LPX) (formula: $C_{21}H_{44}NO_7P$).
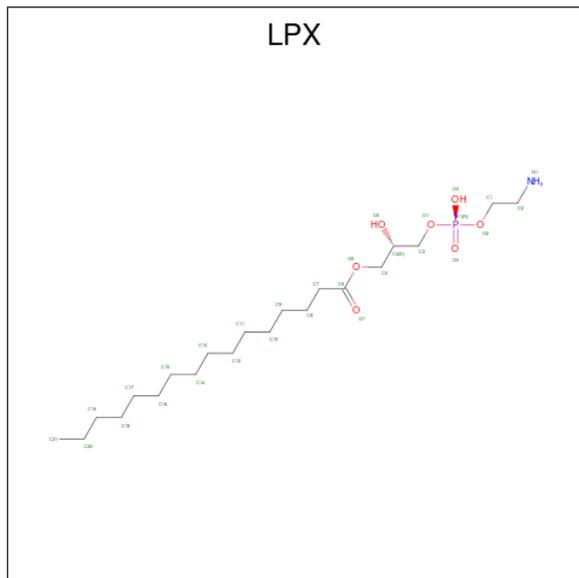
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
3	A	1	30	21	1	7	1	0	0

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 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: Serum albumin
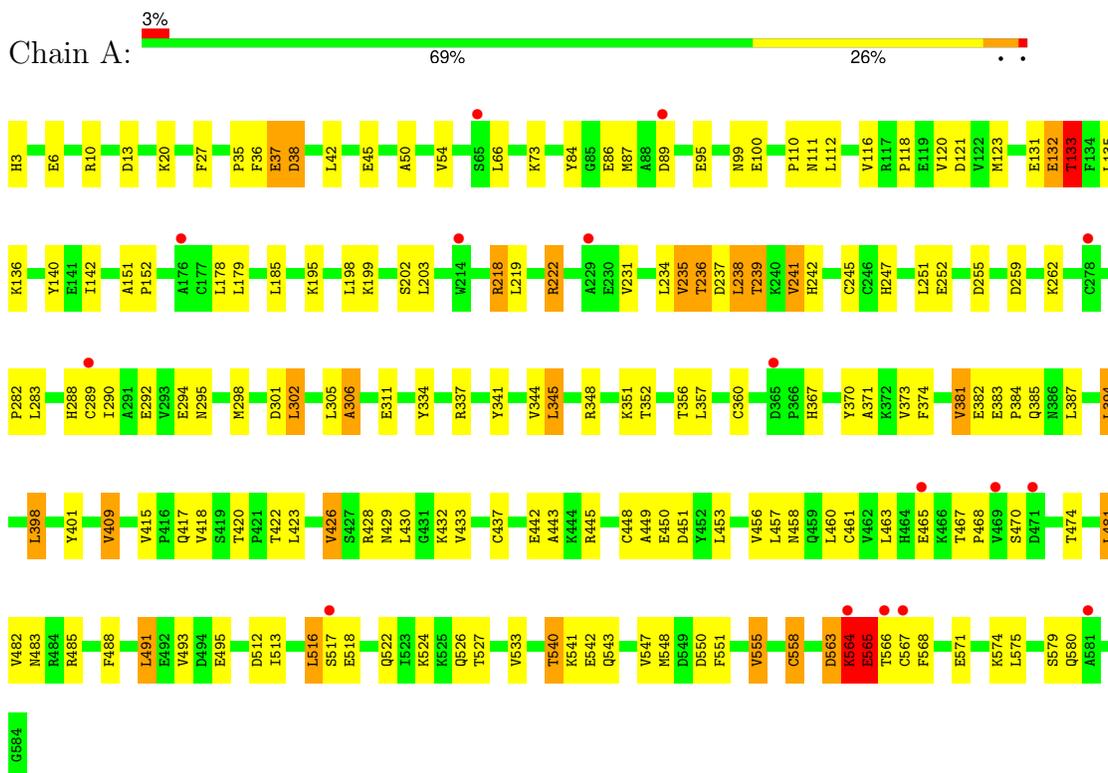
4   Data and refinement statistics   ⓘ

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	183.89Å 39.02Å 95.63Å 90.00° 104.69° 90.00°	Depositor
Resolution (Å)	50.00 – 2.80 50.00 – 2.80	Depositor EDS
% Data completeness (in resolution range)	95.7 (50.00-2.80) 95.5 (50.00-2.80)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	5.25 (at 2.76Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.219 , 0.295 0.241 , 0.310	Depositor DCC
R_{free} test set	805 reflections (5.05%)	wwPDB-VP
Wilson B-factor (Å²)	73.6	Xtriage
Anisotropy	0.262	Xtriage
Bulk solvent k_{sol}(e/Å³), B_{sol}(Å²)	0.33 , 66.1	EDS
L-test for twinning[2]	$< |L| > = 0.48, < L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.89	EDS
Total number of atoms	4591	wwPDB-VP
Average B, all atoms (Å²)	67.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.54% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.

[2]Theoretical values of $< |L| >$, $< L^2 >$ 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: MYR, LPX

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	0.84	0/4582	0.97	1/6205 (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	3

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	288	HIS	N-CA-C	-6.08	104.74	111.36

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	563	ASP	Peptide
1	A	564	LYS	Peptide
1	A	565	GLU	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	4493	0	4290	153	0
2	A	68	0	116	13	0
3	A	30	0	43	23	0
All	All	4591	0	4449	155	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 17.

All (155) 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:222:ARG:HH12	3:A:2001:LPX:H16A	1.19	1.06
1:A:235:VAL:O	1:A:239:THR:HG22	1.60	1.00
1:A:27:PHE:CE2	1:A:42:LEU:HD21	2.05	0.90
1:A:27:PHE:CD2	1:A:42:LEU:HD21	2.07	0.90
1:A:238:LEU:HD21	3:A:2001:LPX:H21	1.55	0.89
1:A:418:VAL:HG11	2:A:1004:MYR:H141	1.54	0.88
1:A:219:LEU:HD12	1:A:235:VAL:HG12	1.55	0.87
1:A:222:ARG:HD2	1:A:295:ASN:ND2	1.91	0.85
1:A:563:ASP:CG	1:A:564:LYS:CB	2.50	0.85
1:A:422:THR:O	1:A:426:VAL:HG13	1.79	0.83
1:A:222:ARG:NH1	3:A:2001:LPX:H16A	1.95	0.81
1:A:563:ASP:OD1	1:A:564:LYS:CB	2.30	0.80
1:A:298:MET:HE1	1:A:337:ARG:HA	1.63	0.79
1:A:565:GLU:O	1:A:568:PHE:HB2	1.82	0.79
1:A:222:ARG:HH12	3:A:2001:LPX:C16	1.96	0.76
1:A:394:LEU:CD2	1:A:398:LEU:HD22	2.16	0.75
1:A:42:LEU:HD11	1:A:73:LYS:HG2	1.68	0.74
1:A:394:LEU:HD22	1:A:398:LEU:HD22	1.66	0.74
1:A:512:ASP:O	1:A:516:LEU:HD23	1.88	0.74
1:A:341:TYR:CD1	1:A:345:LEU:HD13	2.23	0.74
1:A:373:VAL:HG13	1:A:374:PHE:HD1	1.54	0.73
1:A:27:PHE:CD2	1:A:42:LEU:CD2	2.72	0.72
1:A:418:VAL:HG11	2:A:1004:MYR:C14	2.20	0.71
1:A:563:ASP:CB	1:A:564:LYS:CB	2.69	0.71
1:A:348:ARG:NH1	2:A:1003:MYR:O1	2.22	0.70
1:A:27:PHE:CZ	1:A:42:LEU:HD21	2.26	0.70
1:A:27:PHE:CG	1:A:42:LEU:HD21	2.28	0.69
1:A:245:CYS:SG	3:A:2001:LPX:H3A	2.35	0.67
1:A:488:PHE:HA	1:A:491:LEU:HD22	1.77	0.66

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:27:PHE:CG	1:A:42:LEU:CD2	2.79	0.66
1:A:242:HIS:NE2	3:A:2001:LPX:O5	2.32	0.63
1:A:418:VAL:HG21	2:A:1004:MYR:H132	1.80	0.63
1:A:222:ARG:HD2	1:A:295:ASN:HD22	1.65	0.62
1:A:242:HIS:HE1	3:A:2001:LPX:C20	2.13	0.61
1:A:428:ARG:HH21	1:A:526:GLN:HE22	1.48	0.61
1:A:373:VAL:HG13	1:A:374:PHE:CD1	2.36	0.60
1:A:241:VAL:CG2	3:A:2001:LPX:H5A	2.33	0.59
1:A:563:ASP:HB3	1:A:564:LYS:CB	2.31	0.59
1:A:222:ARG:HD2	1:A:295:ASN:HD21	1.68	0.58
1:A:344:VAL:HG13	1:A:450:GLU:OE2	2.02	0.58
1:A:84:TYR:HB3	1:A:87:MET:HE3	1.85	0.58
1:A:238:LEU:HD21	3:A:2001:LPX:C21	2.30	0.58
1:A:457:LEU:HD21	2:A:1004:MYR:H72	1.86	0.57
1:A:423:LEU:CD2	2:A:1004:MYR:H142	2.34	0.57
1:A:558:CYS:SG	1:A:567:CYS:CB	2.93	0.56
1:A:565:GLU:O	1:A:568:PHE:N	2.36	0.56
1:A:430:LEU:HA	1:A:433:VAL:HG12	1.88	0.56
1:A:50:ALA:O	1:A:54:VAL:HG23	2.07	0.55
1:A:231:VAL:O	1:A:235:VAL:HG13	2.06	0.55
1:A:382:GLU:HA	1:A:385:GLN:HE21	1.71	0.55
1:A:420:THR:CG2	1:A:527:THR:HG23	2.36	0.55
1:A:488:PHE:O	1:A:491:LEU:HD22	2.07	0.55
1:A:100:GLU:OE1	1:A:247:HIS:HE1	1.89	0.55
1:A:42:LEU:CD1	1:A:73:LYS:HE2	2.38	0.54
1:A:132:GLU:O	1:A:133:THR:CB	2.56	0.53
1:A:198:LEU:HD13	1:A:458:ASN:CG	2.34	0.53
1:A:241:VAL:CG2	3:A:2001:LPX:C5	2.86	0.53
1:A:298:MET:CE	1:A:337:ARG:HA	2.33	0.53
1:A:423:LEU:HD23	2:A:1004:MYR:H142	1.90	0.53
1:A:485:ARG:HD3	2:A:1003:MYR:H52	1.91	0.53
1:A:242:HIS:CE1	3:A:2001:LPX:C20	2.91	0.53
1:A:429:ASN:HD22	1:A:432:LYS:NZ	2.07	0.53
1:A:420:THR:HG21	1:A:527:THR:HG23	1.91	0.52
1:A:36:PHE:O	1:A:38:ASP:N	2.43	0.52
1:A:10:ARG:NH2	1:A:255:ASP:OD2	2.43	0.52
1:A:110:PRO:O	1:A:111:ASN:CG	2.53	0.52
1:A:370:TYR:O	1:A:370:TYR:CD1	2.63	0.52
1:A:418:VAL:HG21	2:A:1004:MYR:C13	2.39	0.51
1:A:110:PRO:HG2	1:A:112:LEU:HD12	1.92	0.50
1:A:27:PHE:CE1	1:A:42:LEU:HD21	2.47	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:467:THR:HG23	1:A:467:THR:O	2.11	0.50
1:A:202:SER:OG	1:A:481:LEU:CD1	2.60	0.50
1:A:241:VAL:HG22	3:A:2001:LPX:H5A	1.94	0.50
1:A:558:CYS:SG	1:A:567:CYS:HB2	2.51	0.50
1:A:429:ASN:O	1:A:430:LEU:C	2.54	0.50
1:A:195:LYS:NZ	1:A:451:ASP:OD2	2.45	0.49
1:A:298:MET:HE2	1:A:302:LEU:HD12	1.93	0.49
1:A:370:TYR:O	1:A:370:TYR:HD1	1.95	0.49
1:A:445:ARG:O	1:A:448:CYS:HB3	2.12	0.49
1:A:27:PHE:CD1	1:A:42:LEU:HD21	2.47	0.49
1:A:66:LEU:HB3	1:A:251:LEU:HD13	1.93	0.49
1:A:305:LEU:O	1:A:306:ALA:C	2.55	0.49
1:A:100:GLU:OE1	1:A:247:HIS:CE1	2.67	0.48
1:A:341:TYR:OH	1:A:381:VAL:HG21	2.14	0.48
1:A:84:TYR:HB3	1:A:87:MET:CE	2.44	0.48
1:A:418:VAL:HG21	2:A:1004:MYR:C14	2.44	0.48
1:A:542:GLU:HA	1:A:542:GLU:OE1	2.14	0.48
1:A:360:CYS:HB3	1:A:370:TYR:HD2	1.79	0.47
1:A:84:TYR:CB	1:A:87:MET:HE3	2.45	0.47
1:A:234:LEU:O	1:A:238:LEU:HB2	2.15	0.47
1:A:237:ASP:O	1:A:241:VAL:CG1	2.63	0.47
1:A:383:GLU:HB3	1:A:384:PRO:HD3	1.97	0.47
1:A:282:PRO:O	1:A:283:LEU:C	2.57	0.47
1:A:360:CYS:SG	1:A:370:TYR:HB3	2.55	0.47
1:A:13:ASP:OD2	1:A:283:LEU:HD13	2.15	0.46
1:A:488:PHE:HA	1:A:491:LEU:CD2	2.43	0.46
1:A:66:LEU:HB3	1:A:251:LEU:CD1	2.46	0.46
1:A:517:SER:O	1:A:518:GLU:C	2.58	0.46
1:A:463:LEU:O	1:A:467:THR:HG22	2.16	0.46
1:A:540:THR:HG23	1:A:543:GLN:HG3	1.97	0.46
1:A:132:GLU:OE1	1:A:136:LYS:HG2	2.15	0.45
1:A:116:VAL:O	1:A:116:VAL:HG23	2.16	0.45
1:A:151:ALA:HB3	1:A:152:PRO:HD3	1.99	0.45
1:A:245:CYS:CB	3:A:2001:LPX:H3A	2.46	0.45
1:A:27:PHE:CG	1:A:42:LEU:HD23	2.50	0.45
1:A:551:PHE:O	1:A:555:VAL:HG22	2.17	0.45
1:A:36:PHE:HB2	1:A:140:TYR:CD1	2.52	0.45
1:A:95:GLU:OE2	1:A:99:ASN:HB2	2.17	0.45
1:A:35:PRO:O	1:A:38:ASP:HB3	2.17	0.44
3:A:2001:LPX:H18A	3:A:2001:LPX:H15	1.59	0.44
1:A:3:HIS:ND1	1:A:6:GLU:HA	2.33	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:2001:LPX:H7	3:A:2001:LPX:H10A	1.83	0.44
1:A:110:PRO:C	1:A:111:ASN:ND2	2.76	0.44
1:A:132:GLU:O	1:A:133:THR:HB	2.18	0.44
1:A:245:CYS:SG	3:A:2001:LPX:C3	3.04	0.44
1:A:110:PRO:C	1:A:111:ASN:CG	2.86	0.44
1:A:120:VAL:HA	1:A:123:MET:HE3	1.99	0.44
1:A:42:LEU:HD12	1:A:73:LYS:HE2	2.00	0.43
1:A:409:VAL:HB	1:A:533:VAL:HG21	2.00	0.43
1:A:222:ARG:NH1	3:A:2001:LPX:H14	2.34	0.43
1:A:45:GLU:OE2	1:A:73:LYS:NZ	2.41	0.43
1:A:430:LEU:HD23	1:A:456:VAL:HG11	2.01	0.43
1:A:540:THR:O	1:A:541:LYS:C	2.62	0.43
1:A:461:CYS:O	1:A:465:GLU:N	2.52	0.43
1:A:548:MET:HE2	2:A:1005:MYR:H31	2.00	0.43
1:A:236:THR:O	1:A:239:THR:HG23	2.19	0.42
1:A:238:LEU:CD2	3:A:2001:LPX:H21	2.38	0.42
1:A:540:THR:HG23	1:A:543:GLN:OE1	2.19	0.42
1:A:242:HIS:HE1	3:A:2001:LPX:H21	1.84	0.42
1:A:367:HIS:O	1:A:371:ALA:HB2	2.20	0.42
1:A:401:TYR:CE2	1:A:522:GLN:HG2	2.55	0.42
1:A:289:CYS:O	1:A:290:ILE:C	2.63	0.42
1:A:222:ARG:HH12	3:A:2001:LPX:C14	2.33	0.42
1:A:259:ASP:O	1:A:262:LYS:HB3	2.20	0.42
1:A:418:VAL:CG1	2:A:1004:MYR:H141	2.39	0.42
1:A:430:LEU:O	1:A:433:VAL:CG1	2.68	0.42
1:A:241:VAL:HG21	3:A:2001:LPX:H5A	2.02	0.41
1:A:567:CYS:O	1:A:571:GLU:HB2	2.19	0.41
1:A:118:PRO:O	1:A:123:MET:HE2	2.20	0.41
1:A:218:ARG:NH2	1:A:222:ARG:HD3	2.36	0.41
1:A:482:VAL:HG23	1:A:483:ASN:OD1	2.19	0.41
1:A:418:VAL:HG21	2:A:1004:MYR:H141	2.02	0.41
1:A:488:PHE:CA	1:A:491:LEU:HD22	2.49	0.41
1:A:449:ALA:O	1:A:450:GLU:C	2.63	0.41
1:A:579:SER:O	1:A:580:GLN:C	2.64	0.41
1:A:437:CYS:O	1:A:445:ARG:HG2	2.20	0.41
1:A:242:HIS:CE1	3:A:2001:LPX:H20A	2.55	0.41
1:A:442:GLU:O	1:A:443:ALA:C	2.64	0.40
1:A:86:GLU:O	1:A:89:ASP:HB2	2.22	0.40
1:A:428:ARG:HD2	1:A:526:GLN:HE22	1.86	0.40
1:A:550:ASP:HB3	1:A:575:LEU:HD11	2.03	0.40
1:A:242:HIS:CE1	3:A:2001:LPX:O5	2.75	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:467:THR:N	1:A:468:PRO:HD3	2.37	0.40
1:A:493:VAL:HG12	1:A:495:GLU:HG3	2.03	0.40
1:A:565:GLU:O	1:A:568:PHE:CB	2.64	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 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 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	580/582 (100%)	540 (93%)	34 (6%)	6 (1%)	13	39

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	564	LYS
1	A	38	ASP
1	A	133	THR
1	A	558	CYS
1	A	37	GLU
1	A	306	ALA

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	468/509 (92%)	413 (88%)	55 (12%)	4 14

All (55) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	20	LYS
1	A	37	GLU
1	A	121	ASP
1	A	131	GLU
1	A	132	GLU
1	A	133	THR
1	A	135	LEU
1	A	142	ILE
1	A	178	LEU
1	A	179	LEU
1	A	185	LEU
1	A	199	LYS
1	A	203	LEU
1	A	218	ARG
1	A	222	ARG
1	A	235	VAL
1	A	236	THR
1	A	238	LEU
1	A	239	THR
1	A	241	VAL
1	A	252	GLU
1	A	292	GLU
1	A	294	GLU
1	A	301	ASP
1	A	302	LEU
1	A	311	GLU
1	A	334	TYR
1	A	345	LEU
1	A	351	LYS
1	A	352	THR
1	A	356	THR
1	A	357	LEU
1	A	381	VAL
1	A	387	LEU
1	A	394	LEU
1	A	398	LEU
1	A	409	VAL
1	A	415	VAL

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Mol	Chain	Res	Type
1	A	417	GLN
1	A	426	VAL
1	A	453	LEU
1	A	460	LEU
1	A	470	SER
1	A	474	THR
1	A	481	LEU
1	A	491	LEU
1	A	513	ILE
1	A	516	LEU
1	A	524	LYS
1	A	540	THR
1	A	547	VAL
1	A	555	VAL
1	A	565	GLU
1	A	566	THR
1	A	574	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (14) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	32	GLN
1	A	44	ASN
1	A	105	HIS
1	A	130	ASN
1	A	146	HIS
1	A	242	HIS
1	A	247	HIS
1	A	295	ASN
1	A	318	ASN
1	A	385	GLN
1	A	391	ASN
1	A	405	ASN
1	A	429	ASN
1	A	526	GLN

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 oligosaccharides in this entry.

5.6 Ligand geometry (i)

6 ligands are modelled in this entry.

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	#$|Z| > 2$
2	MYR	A	1006	-	15,15,15	0.61	0	15,15,15	0.83	0
2	MYR	A	1003	-	15,15,15	0.49	0	15,15,15	1.38	2 (13%)
2	MYR	A	1002	-	8,8,15	0.49	0	7,7,15	0.27	0
3	LPX	A	2001	-	29,29,29	0.87	1 (3%)	31,33,33	1.01	2 (6%)
2	MYR	A	1005	-	15,15,15	0.62	0	15,15,15	0.83	0
2	MYR	A	1004	-	10,10,15	0.28	0	9,9,15	0.60	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
2	MYR	A	1006	-	-	8/13/13/13	-
2	MYR	A	1003	-	-	12/13/13/13	-
2	MYR	A	1002	-	-	5/6/6/13	-
3	LPX	A	2001	-	-	23/31/31/31	-
2	MYR	A	1005	-	-	8/13/13/13	-
2	MYR	A	1004	-	-	8/8/8/13	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	2001	LPX	O6-C6	4.00	1.45	1.33

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	2001	LPX	O6-C6-C7	3.46	122.38	111.83
2	A	1003	MYR	O2-C1-C2	3.40	124.75	114.00
2	A	1003	MYR	O1-C1-C2	-3.23	112.86	123.09
3	A	2001	LPX	O6-C6-O7	-2.54	117.27	123.63

There are no chirality outliers.

All (64) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	2001	LPX	O5-C4-C5-O6
3	A	2001	LPX	O1-C3-C4-C5
3	A	2001	LPX	C3-O1-P1-O3
3	A	2001	LPX	C3-O1-P1-O2
3	A	2001	LPX	C3-O1-P1-O4
3	A	2001	LPX	C1-O2-P1-O1
3	A	2001	LPX	C1-O2-P1-O3
3	A	2001	LPX	O7-C6-O6-C5
3	A	2001	LPX	C7-C6-O6-C5
3	A	2001	LPX	O1-C3-C4-O5
2	A	1003	MYR	C10-C11-C12-C13
3	A	2001	LPX	C15-C16-C17-C18
3	A	2001	LPX	C7-C8-C9-C10
2	A	1003	MYR	C1-C2-C3-C4
3	A	2001	LPX	C3-C4-C5-O6
2	A	1005	MYR	C10-C11-C12-C13
3	A	2001	LPX	C12-C13-C14-C15
3	A	2001	LPX	C9-C10-C11-C12
2	A	1004	MYR	C11-C10-C9-C8
3	A	2001	LPX	C18-C19-C20-C21
2	A	1004	MYR	C7-C8-C9-C10
3	A	2001	LPX	C11-C12-C13-C14
2	A	1003	MYR	C7-C8-C9-C10
3	A	2001	LPX	C10-C11-C12-C13
2	A	1004	MYR	C10-C11-C12-C13
2	A	1005	MYR	C4-C5-C6-C7
2	A	1005	MYR	C2-C3-C4-C5

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Mol	Chain	Res	Type	Atoms
2	A	1006	MYR	C11-C10-C9-C8
3	A	2001	LPX	C16-C17-C18-C19
3	A	2001	LPX	C11-C10-C9-C8
2	A	1003	MYR	C9-C10-C11-C12
2	A	1002	MYR	C6-C7-C8-C9
2	A	1003	MYR	C2-C3-C4-C5
2	A	1002	MYR	C7-C8-C9-C10
2	A	1005	MYR	C9-C10-C11-C12
2	A	1004	MYR	C5-C6-C7-C8
2	A	1005	MYR	C6-C7-C8-C9
2	A	1006	MYR	C3-C4-C5-C6
2	A	1006	MYR	C4-C5-C6-C7
2	A	1003	MYR	C11-C12-C13-C14
2	A	1004	MYR	C4-C5-C6-C7
2	A	1002	MYR	C11-C10-C9-C8
2	A	1005	MYR	C5-C6-C7-C8
2	A	1003	MYR	C3-C4-C5-C6
3	A	2001	LPX	C6-C7-C8-C9
2	A	1003	MYR	C4-C5-C6-C7
3	A	2001	LPX	C17-C18-C19-C20
2	A	1006	MYR	C1-C2-C3-C4
2	A	1003	MYR	C6-C7-C8-C9
2	A	1006	MYR	C6-C7-C8-C9
3	A	2001	LPX	C14-C15-C16-C17
2	A	1004	MYR	C11-C12-C13-C14
2	A	1002	MYR	C5-C6-C7-C8
2	A	1003	MYR	C5-C6-C7-C8
2	A	1004	MYR	C9-C10-C11-C12
2	A	1004	MYR	C6-C7-C8-C9
2	A	1003	MYR	O2-C1-C2-C3
2	A	1003	MYR	O1-C1-C2-C3
2	A	1005	MYR	O2-C1-C2-C3
2	A	1006	MYR	C7-C8-C9-C10
2	A	1006	MYR	C5-C6-C7-C8
2	A	1005	MYR	O1-C1-C2-C3
2	A	1006	MYR	C11-C12-C13-C14
2	A	1002	MYR	C9-C10-C11-C12

There are no ring outliers.

4 monomers are involved in 36 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1003	MYR	2	0
3	A	2001	LPX	23	0
2	A	1005	MYR	1	0
2	A	1004	MYR	10	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

Ligand LPX A 2001

Bond lengths   Bond angles

Torsions   Rings
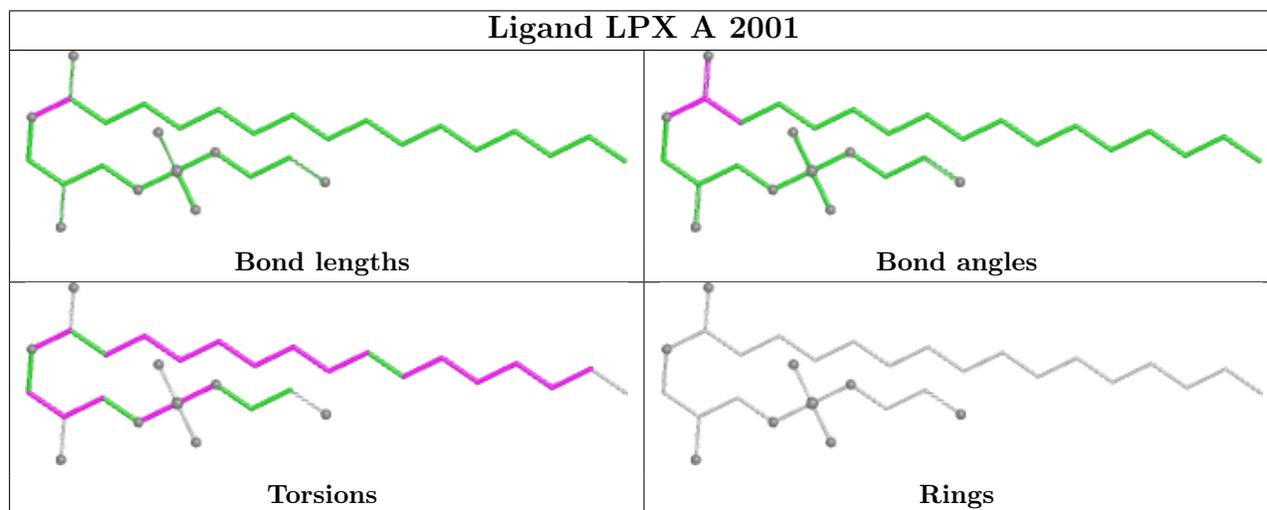
5.7 Other polymers ⓘ

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 ⓘ

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	582/582 (100%)	0.47	16 (2%)	56	47	54, 67, 72, 78	2 (0%)

All (16) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	566	THR	3.3
1	A	517	SER	3.2
1	A	289	CYS	3.1
1	A	564	LYS	2.9
1	A	278	CYS	2.9
1	A	471	ASP	2.9
1	A	469	VAL	2.7
1	A	89	ASP	2.6
1	A	176	ALA	2.5
1	A	229	ALA	2.4
1	A	465	GLU	2.4
1	A	65	SER	2.4
1	A	581	ALA	2.3
1	A	214	TRP	2.1
1	A	567	CYS	2.1
1	A	365	ASP	2.0

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

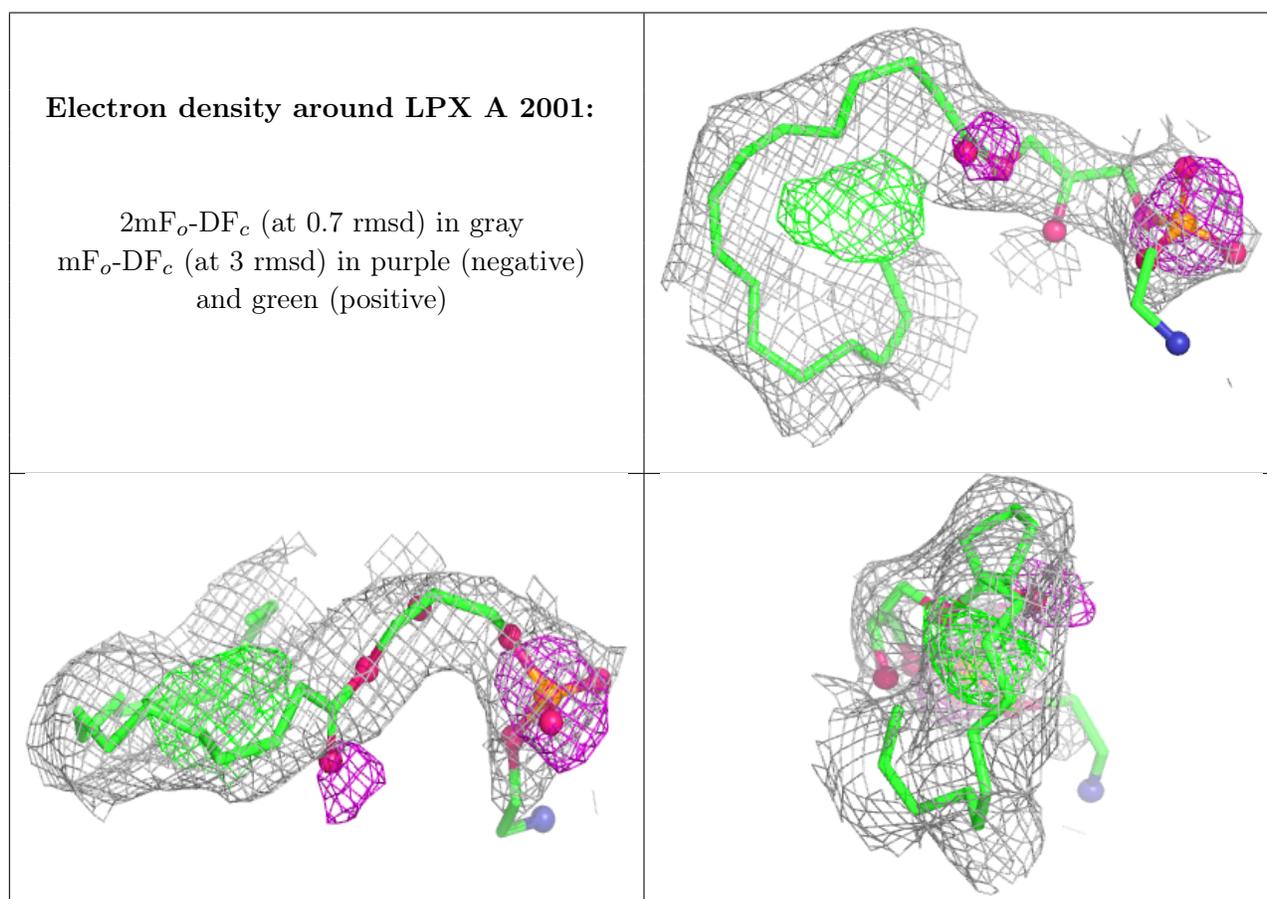There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

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(Å^2)	Q<0.9
3	LPX	A	2001	30/30	0.77	0.15	82,91,97,97	0
2	MYR	A	1005	16/16	0.80	0.13	62,69,75,76	0
2	MYR	A	1002	9/16	0.80	0.15	74,77,82,82	0
2	MYR	A	1006	16/16	0.85	0.13	78,81,86,89	0
2	MYR	A	1003	16/16	0.88	0.10	60,67,73,74	0
2	MYR	A	1004	11/16	0.91	0.09	71,76,84,85	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around LPX A 2001:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)

6.5 Other polymers ⓘ

There are no such residues in this entry.