



Full wwPDB X-ray Structure Validation Report ⓘ

Jul 3, 2024 – 02:05 pm BST

PDB ID : 9FWG
Title : LSD1/CoREST bound to bomedemstat
Authors : Speranzini, V.; Mattevi, A.
Deposited on : 2024-06-30
Resolution : 3.20 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 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
Mogul : 1.8.4, CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.37.1
buster-report : 1.1.7 (2018)
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) : 2.37.1

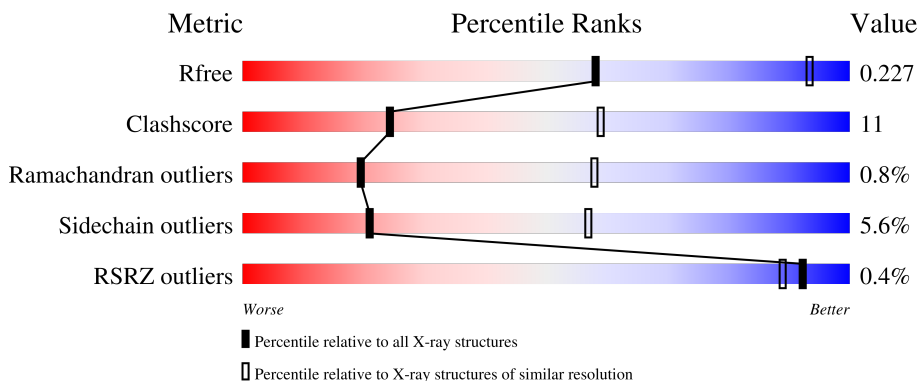
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.20 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	1133 (3.20-3.20)
Clashscore	141614	1253 (3.20-3.20)
Ramachandran outliers	138981	1234 (3.20-3.20)
Sidechain outliers	138945	1233 (3.20-3.20)
RSRZ outliers	127900	1095 (3.20-3.20)

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	852	 56% 20% 22%
2	B	485	 18% 8% 73%

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 6357 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.

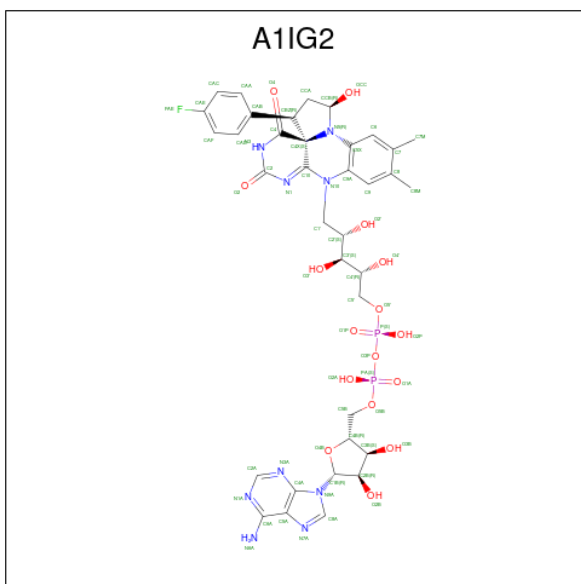
- Molecule 1 is a protein called Lysine-specific histone demethylase 1A.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	666	5217	3324	906	967	20	0	0	0

- Molecule 2 is a protein called REST corepressor 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	133	1076	676	194	203	3	0	0	0

- Molecule 3 is Bomedemstat FAD adduct (three-letter code: A1IG2) (formula: $C_{36}H_{42}FN_9O_{16}P_2$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
			Total	C	F	N	O			P
3	A	1	64	36	1	9	16	2	0	0

4 Data and refinement statistics

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, α , β , γ	119.66Å 179.02Å 234.55Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	98.00 – 3.20 99.48 – 3.20	Depositor EDS
% Data completeness (in resolution range)	97.7 (98.00-3.20) 97.7 (99.48-3.20)	Depositor EDS
R_{merge}	0.19	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.61 (at 3.19Å)	Xtrriage
Refinement program	REFMAC 5.8.0131	Depositor
R, R_{free}	0.191 , 0.227 0.194 , 0.227	Depositor DCC
R_{free} test set	802 reflections (1.96%)	wwPDB-VP
Wilson B-factor (Å ²)	77.8	Xtrriage
Anisotropy	0.525	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 57.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	6357	wwPDB-VP
Average B, all atoms (Å ²)	83.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.01% 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](#)

Bond lengths and bond angles in the following residue types are not validated in this section: A1IG2

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	1.13	11/5331 (0.2%)	1.17	26/7232 (0.4%)
2	B	0.86	0/1091	1.08	7/1471 (0.5%)
All	All	1.09	11/6422 (0.2%)	1.16	33/8703 (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	A	0	1
2	B	0	1
All	All	0	2

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	646	TRP	CB-CG	-10.97	1.30	1.50
1	A	821	GLU	CD-OE1	6.43	1.32	1.25
1	A	387	GLU	CG-CD	6.06	1.61	1.51
1	A	591	ARG	CZ-NH1	5.92	1.40	1.33
1	A	596	THR	CB-CG2	5.82	1.71	1.52
1	A	792	PRO	CA-C	5.78	1.64	1.52
1	A	768	SER	CA-CB	5.75	1.61	1.52
1	A	801	GLU	C-O	-5.58	1.12	1.23
1	A	531	TRP	CB-CG	-5.23	1.40	1.50
1	A	639	PHE	C-O	5.10	1.33	1.23
1	A	777	ALA	C-O	5.05	1.32	1.23

All (33) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	795	ARG	NE-CZ-NH1	9.77	125.18	120.30
1	A	397	ASP	CB-CG-OD1	9.03	126.42	118.30
1	A	555	ASP	CB-CG-OD1	8.68	126.11	118.30
1	A	795	ARG	NE-CZ-NH2	-8.60	116.00	120.30
1	A	295	ARG	NE-CZ-NH2	-8.30	116.15	120.30
1	A	591	ARG	NE-CZ-NH2	-8.27	116.17	120.30
2	B	427	ARG	NE-CZ-NH2	8.13	124.36	120.30
1	A	538	PHE	CB-CG-CD1	-7.23	115.74	120.80
1	A	332	MET	CG-SD-CE	6.58	110.72	100.20
1	A	688	ARG	NE-CZ-NH1	6.29	123.44	120.30
1	A	377	MET	CB-CG-SD	6.10	130.69	112.40
1	A	526	ARG	NE-CZ-NH1	6.03	123.31	120.30
2	B	400	ARG	NE-CZ-NH1	6.03	123.31	120.30
1	A	524	ARG	NE-CZ-NH1	5.90	123.25	120.30
1	A	182	ARG	NE-CZ-NH1	5.86	123.23	120.30
1	A	312	ARG	NE-CZ-NH1	5.76	123.18	120.30
2	B	431	ASP	CB-CG-OD1	5.54	123.29	118.30
1	A	397	ASP	CB-CG-OD2	-5.42	113.42	118.30
1	A	525	ASP	CB-CG-OD1	-5.34	113.50	118.30
1	A	821	GLU	CG-CD-OE1	5.32	128.95	118.30
2	B	426	ARG	CA-CB-CG	5.29	125.04	113.40
1	A	295	ARG	NE-CZ-NH1	5.29	122.94	120.30
2	B	308	ARG	NE-CZ-NH1	5.28	122.94	120.30
1	A	458	LEU	CB-CA-C	-5.24	100.24	110.20
1	A	187	ARG	NE-CZ-NH1	5.23	122.92	120.30
1	A	377	MET	CG-SD-CE	5.20	108.52	100.20
2	B	382	ARG	NE-CZ-NH1	5.18	122.89	120.30
1	A	820	ARG	NE-CZ-NH1	5.17	122.89	120.30
1	A	776	MET	CG-SD-CE	-5.13	92.00	100.20
1	A	688	ARG	NE-CZ-NH2	-5.08	117.76	120.30
2	B	314	MET	CG-SD-CE	-5.05	92.11	100.20
1	A	720	ASP	CB-CG-OD1	5.02	122.82	118.30
1	A	773	TYR	CB-CG-CD2	-5.02	117.99	121.00

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	792	PRO	Peptide
2	B	377	GLN	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	5217	0	5252	112	0
2	B	1076	0	1090	36	0
3	A	64	0	0	2	0
All	All	6357	0	6342	139	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 11.

All (139) 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)
2:B:425:ARG:CZ	2:B:431:ASP:OD1	2.03	1.06
1:A:566:THR:HG21	1:A:697:LEU:HD22	1.55	0.89
1:A:801:GLU:HG2	1:A:809:ALA:HA	1.59	0.85
2:B:425:ARG:NH2	2:B:431:ASP:OD1	2.12	0.81
1:A:606:ASN:O	1:A:609:SER:O	2.03	0.77
1:A:771:ASN:HA	1:A:805:ARG:NH1	2.04	0.73
1:A:374:LYS:O	1:A:378:VAL:HG23	1.87	0.72
1:A:526:ARG:NH1	1:A:530:ASP:OD1	2.22	0.72
1:A:384:ARG:NH2	2:B:312:LYS:O	2.23	0.71
1:A:566:THR:HG21	1:A:697:LEU:CD2	2.20	0.71
2:B:425:ARG:NH1	2:B:431:ASP:OD1	2.26	0.69
2:B:424:TYR:CE1	2:B:427:ARG:NH1	2.58	0.69
2:B:391:ALA:HB2	2:B:409:ILE:HD11	1.72	0.69
2:B:425:ARG:NH2	2:B:431:ASP:CG	2.46	0.68
1:A:351:MET:HA	1:A:569:ASN:HD21	1.59	0.67
2:B:374:GLU:HA	2:B:374:GLU:OE2	1.96	0.66
1:A:538:PHE:CD1	1:A:706:LEU:HD13	2.31	0.65
2:B:377:GLN:OE1	2:B:411:ASN:HB3	1.97	0.65
1:A:720:ASP:O	1:A:724:VAL:HG23	1.97	0.64
1:A:807:TYR:N	1:A:808:PRO:CD	2.61	0.63
1:A:402:ASN:O	1:A:402:ASN:OD1	2.17	0.62
2:B:391:ALA:HB2	2:B:409:ILE:CD1	2.30	0.61
1:A:540:ASN:HB3	1:A:547:LEU:HD21	1.83	0.59
2:B:403:GLN:OE1	2:B:403:GLN:HA	2.02	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:424:TYR:HA	2:B:427:ARG:HE	1.67	0.59
1:A:456:LYS:HA	2:B:370:TYR:CE2	2.38	0.58
1:A:810:THR:HG22	3:A:901:A1IG2:CAC	2.33	0.58
1:A:537:GLU:HG2	1:A:544:LEU:CD2	2.35	0.57
1:A:533:PHE:O	1:A:537:GLU:HG3	2.05	0.57
1:A:693:LEU:HD12	1:A:694:PHE:N	2.19	0.56
1:A:332:MET:SD	1:A:661:LYS:NZ	2.79	0.56
1:A:256:LEU:HB3	1:A:262:ILE:HG12	1.87	0.55
1:A:392:LEU:HD23	1:A:398:PHE:CD2	2.42	0.55
2:B:418:LYS:O	2:B:421:PHE:HB2	2.07	0.55
1:A:282:ILE:HG21	1:A:602:VAL:HG21	1.88	0.54
1:A:538:PHE:CE1	1:A:706:LEU:HD13	2.42	0.54
1:A:401:LEU:O	1:A:402:ASN:OD1	2.25	0.54
2:B:391:ALA:CB	2:B:409:ILE:HD11	2.37	0.54
1:A:245:ASP:OD1	1:A:247:VAL:HG22	2.08	0.54
1:A:640:VAL:O	1:A:640:VAL:HG12	2.06	0.54
2:B:327:ASN:ND2	2:B:330:ALA:HB2	2.22	0.54
2:B:425:ARG:NH2	2:B:431:ASP:OD2	2.41	0.54
1:A:306:LEU:HD13	1:A:584:ILE:HG12	1.91	0.53
1:A:538:PHE:CE1	1:A:706:LEU:HD22	2.43	0.53
1:A:538:PHE:HE1	1:A:706:LEU:HD22	1.73	0.53
1:A:569:ASN:OD1	1:A:569:ASN:N	2.34	0.53
1:A:384:ARG:C	2:B:314:MET:HE1	2.28	0.53
2:B:415:VAL:HG22	2:B:419:ASN:HD21	1.74	0.52
1:A:467:GLU:O	1:A:468:VAL:C	2.45	0.52
1:A:364:GLU:OE2	1:A:524:ARG:HG2	2.10	0.52
1:A:366:ASN:OD1	1:A:367:GLY:N	2.43	0.51
1:A:772:ASP:HA	1:A:775:LEU:HD12	1.93	0.51
1:A:801:GLU:CG	1:A:809:ALA:HA	2.38	0.51
1:A:773:TYR:CE2	1:A:808:PRO:HB3	2.47	0.50
1:A:501:GLN:O	1:A:505:GLU:HB2	2.12	0.50
1:A:385:LEU:O	1:A:388:ALA:HB3	2.12	0.49
1:A:510:GLU:HG3	1:A:511:LEU:HD23	1.94	0.49
1:A:606:ASN:HD22	1:A:609:SER:H	1.61	0.49
2:B:347:ARG:HG3	2:B:348:GLN:N	2.26	0.49
1:A:374:LYS:O	1:A:375:ASP:C	2.51	0.48
2:B:415:VAL:HG22	2:B:419:ASN:ND2	2.27	0.48
1:A:364:GLU:O	1:A:365:ALA:C	2.52	0.48
1:A:195:CYS:HB2	1:A:196:PHE:CD1	2.48	0.48
2:B:419:ASN:O	2:B:423:ASN:ND2	2.46	0.48
1:A:418:LEU:HD12	2:B:324:VAL:HG21	1.95	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:422:HIS:CE1	2:B:315:PHE:CE1	3.02	0.47
1:A:592:GLN:HB3	1:A:603:ILE:HD12	1.96	0.47
1:A:530:ASP:OD2	1:A:685:THR:HA	2.15	0.47
1:A:693:LEU:HD12	1:A:694:PHE:H	1.79	0.47
1:A:794:PRO:HD2	1:A:828:GLN:NE2	2.30	0.47
1:A:438:GLN:HE21	1:A:508:LEU:HD13	1.80	0.47
1:A:594:ARG:HA	1:A:640:VAL:O	2.15	0.47
1:A:261:LEU:HD23	1:A:261:LEU:HA	1.63	0.46
1:A:786:ILE:H	1:A:786:ILE:HD12	1.80	0.46
1:A:574:VAL:HB	1:A:575:PRO:CD	2.45	0.46
1:A:548:SER:O	1:A:552:TRP:HB3	2.15	0.46
1:A:270:ILE:O	1:A:272:PRO:HD3	2.16	0.46
1:A:771:ASN:CA	1:A:805:ARG:NH1	2.76	0.45
1:A:353:LEU:HB3	1:A:565:LEU:CD2	2.46	0.45
1:A:660:ASN:OD1	1:A:749:SER:OG	2.27	0.45
1:A:671:TRP:O	1:A:673:PRO:HD3	2.17	0.45
1:A:572:SER:O	1:A:573:CYS:C	2.55	0.45
1:A:670:PHE:HD1	1:A:670:PHE:O	2.00	0.45
1:A:196:PHE:N	1:A:197:PRO:CD	2.80	0.45
1:A:489:ALA:O	1:A:492:LYS:HB2	2.16	0.45
1:A:364:GLU:OE2	1:A:524:ARG:CG	2.64	0.44
1:A:199:ILE:HD11	1:A:248:LEU:HD11	1.99	0.44
1:A:386:LEU:O	1:A:387:GLU:C	2.56	0.44
2:B:395:ILE:HG22	2:B:433:VAL:HG12	2.00	0.44
1:A:572:SER:O	1:A:574:VAL:N	2.50	0.44
1:A:804:ILE:O	1:A:808:PRO:HD3	2.18	0.44
1:A:245:ASP:OD1	1:A:245:ASP:C	2.56	0.44
1:A:331:ALA:HA	3:A:901:A1IG2:N5	2.33	0.44
1:A:456:LYS:HA	2:B:370:TYR:HE2	1.83	0.44
1:A:199:ILE:HD11	1:A:248:LEU:CD1	2.48	0.44
1:A:427:GLN:NE2	1:A:518:ASP:HA	2.33	0.44
2:B:409:ILE:O	2:B:409:ILE:HG22	2.18	0.43
2:B:430:ILE:HG22	2:B:434:LEU:HD12	1.99	0.43
1:A:793:ILE:HA	1:A:794:PRO:HD3	1.83	0.43
2:B:308:ARG:HH11	2:B:308:ARG:HA	1.82	0.43
1:A:205:GLN:O	1:A:209:VAL:HG23	2.19	0.43
1:A:311:ASP:OD1	1:A:311:ASP:N	2.49	0.43
1:A:691:LEU:HD22	1:A:727:CYS:SG	2.59	0.43
1:A:700:ALA:HB1	1:A:701:PRO:HD2	2.01	0.43
1:A:266:ILE:CD1	1:A:577:ALA:HB1	2.49	0.42
1:A:487:LEU:HD21	2:B:370:TYR:O	2.19	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:633:GLN:HA	1:A:634:PRO:HA	1.74	0.42
2:B:414:VAL:O	2:B:414:VAL:HG12	2.19	0.42
1:A:771:ASN:HA	1:A:805:ARG:HH11	1.80	0.42
1:A:484:HIS:CD2	2:B:372:LEU:HD13	2.55	0.42
1:A:181:SER:OG	1:A:218:LEU:HD22	2.20	0.42
1:A:353:LEU:HB3	1:A:565:LEU:HD22	2.02	0.42
1:A:707:VAL:HG12	1:A:712:ALA:HA	2.02	0.42
1:A:214:ARG:HD2	1:A:215:ASN:OD1	2.19	0.41
1:A:260:GLY:O	1:A:264:PHE:CD2	2.73	0.41
1:A:563:SER:O	1:A:565:LEU:HD12	2.20	0.41
1:A:183:LEU:HD23	1:A:189:THR:HG21	2.01	0.41
1:A:216:ARG:O	1:A:220:LEU:HD12	2.21	0.41
1:A:217:THR:HA	1:A:220:LEU:HD12	2.03	0.41
1:A:221:TRP:CZ3	1:A:225:PRO:HA	2.55	0.41
1:A:538:PHE:CE1	1:A:706:LEU:CD1	3.03	0.41
1:A:255:TYR:CE2	1:A:256:LEU:HD23	2.56	0.41
1:A:507:LYS:O	1:A:507:LYS:HG2	2.21	0.41
1:A:601:GLU:HA	1:A:616:TYR:O	2.20	0.41
1:A:670:PHE:C	1:A:670:PHE:CD1	2.93	0.41
2:B:430:ILE:O	2:B:431:ASP:C	2.59	0.41
1:A:185:HIS:CE1	1:A:186:ASP:HB3	2.56	0.41
1:A:485:ARG:HG3	2:B:407:ASP:HB2	2.03	0.41
1:A:538:PHE:CE1	1:A:706:LEU:CD2	3.04	0.41
1:A:537:GLU:HG2	1:A:544:LEU:HD23	2.00	0.40
1:A:722:VAL:O	1:A:726:ARG:HG3	2.21	0.40
2:B:383:TRP:CE3	2:B:412:LYS:HE2	2.55	0.40
1:A:386:LEU:HD23	1:A:386:LEU:HA	1.90	0.40
1:A:506:GLU:C	1:A:508:LEU:H	2.25	0.40
1:A:468:VAL:O	1:A:472:ARG:NH1	2.54	0.40
1:A:245:ASP:OD1	1:A:247:VAL:CG2	2.68	0.40
1:A:340:ASN:O	1:A:343:ALA:HB3	2.20	0.40
1:A:536:LEU:HB3	1:A:544:LEU:HD21	2.04	0.40
2:B:403:GLN:OE1	2:B:414:VAL:HG22	2.22	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	664/852 (78%)	602 (91%)	57 (9%)	5 (1%)	19	58
2	B	131/485 (27%)	117 (89%)	13 (10%)	1 (1%)	19	58
All	All	795/1337 (60%)	719 (90%)	70 (9%)	6 (1%)	19	58

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	793	ILE
1	A	801	GLU
1	A	507	LYS
1	A	271	LYS
2	B	439	ALA
1	A	364	GLU

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	566/699 (81%)	539 (95%)	27 (5%)	25	61
2	B	117/397 (30%)	106 (91%)	11 (9%)	8	33
All	All	683/1096 (62%)	645 (94%)	38 (6%)	21	57

All (38) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	183	LEU
1	A	226	LYS
1	A	237	GLN
1	A	250	HIS
1	A	268	LYS
1	A	299	SER
1	A	380	GLN
1	A	423	VAL
1	A	433	LYS
1	A	439	GLU
1	A	449	VAL
1	A	454	LYS
1	A	485	ARG
1	A	517	SER
1	A	563	SER
1	A	571	TYR
1	A	591	ARG
1	A	624	THR
1	A	645	GLU
1	A	652	GLN
1	A	667	ASP
1	A	675	VAL
1	A	737	SER
1	A	785	SER
1	A	786	ILE
1	A	791	GLN
1	A	793	ILE
2	B	316	LEU
2	B	317	SER
2	B	343	VAL
2	B	346	LYS
2	B	347	ARG
2	B	374	GLU
2	B	376	ILE
2	B	379	CYS
2	B	385	THR
2	B	422	VAL
2	B	426	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	191	GLN

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Mol	Chain	Res	Type
1	A	422	HIS
1	A	438	GLN
1	A	484	HIS
1	A	554	GLN
1	A	632	GLN
1	A	828	GLN
2	B	419	ASN
2	B	423	ASN

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](#)

1 ligand is 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	$\# Z > 2$
3	A1IG2	A	901	-	62,71,71	2.05	18 (29%)	72,111,111	1.69	14 (19%)

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
3	A1IG2	A	901	-	-	3/34/106/106	0/7/8/8

All (18) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	901	A1IG2	CAD-CAB	5.38	1.47	1.39
3	A	901	A1IG2	CAC-CAE	5.01	1.46	1.37
3	A	901	A1IG2	CAF-CAE	4.95	1.46	1.37
3	A	901	A1IG2	C4X-C4	-4.75	1.49	1.54
3	A	901	A1IG2	CAC-CAA	4.41	1.46	1.38
3	A	901	A1IG2	C5X-C9A	3.66	1.47	1.40
3	A	901	A1IG2	CAF-CAD	3.59	1.45	1.38
3	A	901	A1IG2	CAA-CAB	3.55	1.44	1.39
3	A	901	A1IG2	C1'-C2'	3.02	1.56	1.52
3	A	901	A1IG2	C5'-C4'	2.76	1.55	1.51
3	A	901	A1IG2	C10-N1	2.60	1.39	1.31
3	A	901	A1IG2	O2-C2	2.49	1.28	1.24
3	A	901	A1IG2	C6-C7	-2.42	1.36	1.39
3	A	901	A1IG2	CCA-CBZ	-2.33	1.50	1.55
3	A	901	A1IG2	C2A-N3A	2.32	1.35	1.32
3	A	901	A1IG2	O4-C4	2.25	1.26	1.22
3	A	901	A1IG2	C8-C7	2.17	1.46	1.40
3	A	901	A1IG2	C4A-N3A	2.02	1.38	1.35

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	901	A1IG2	N3A-C2A-N1A	-5.23	120.50	128.68
3	A	901	A1IG2	C5A-C6A-N6A	-4.23	113.92	120.35
3	A	901	A1IG2	N6A-C6A-N1A	3.80	126.47	118.57
3	A	901	A1IG2	P-O3P-PA	-3.78	119.85	132.83
3	A	901	A1IG2	O5'-P-O1P	3.24	121.74	109.07
3	A	901	A1IG2	CCA-CBZ-CAB	-3.01	110.38	116.00
3	A	901	A1IG2	C4X-N5-CCB	2.89	112.45	109.54
3	A	901	A1IG2	O5'-C5'-C4'	2.88	117.06	109.36
3	A	901	A1IG2	O4'-C4'-C3'	2.43	115.01	109.10
3	A	901	A1IG2	C9-C9A-C5X	-2.42	116.42	120.11
3	A	901	A1IG2	O2A-PA-O1A	2.31	123.68	112.24
3	A	901	A1IG2	C5'-C4'-C3'	-2.23	107.89	112.20
3	A	901	A1IG2	C9A-C5X-N5	2.09	124.84	120.11
3	A	901	A1IG2	C8M-C8-C7	-2.00	116.63	120.74

There are no chirality outliers.

All (3) torsion outliers are listed below:

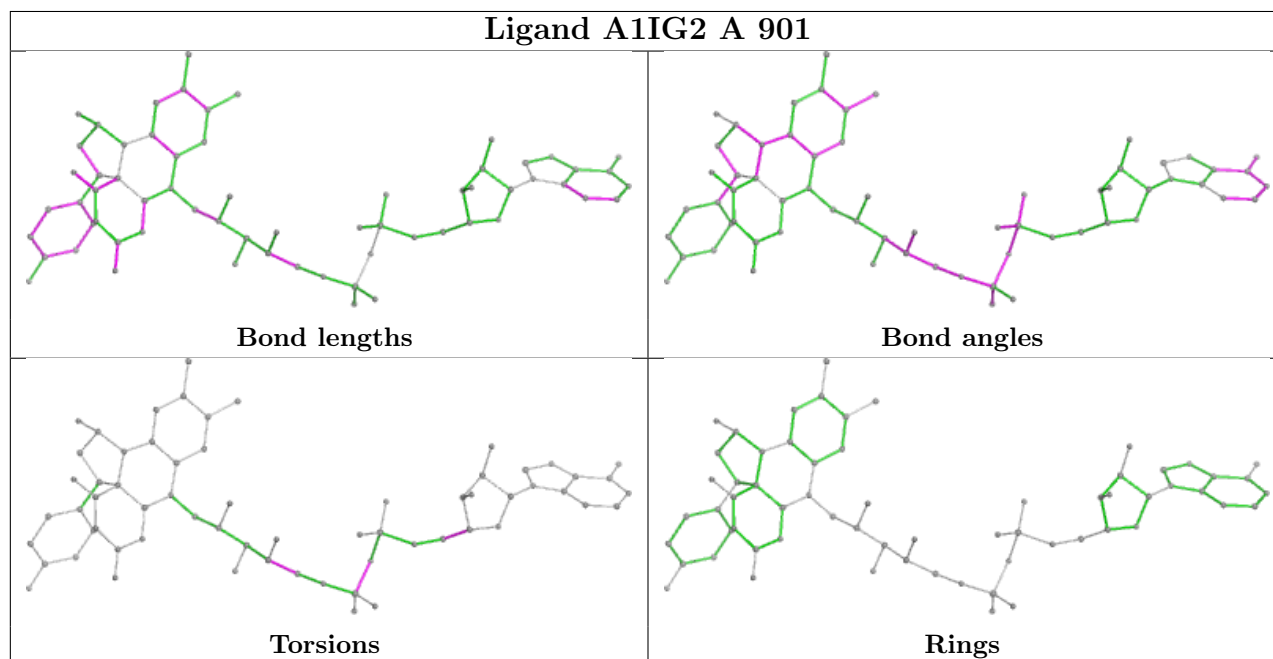
Mol	Chain	Res	Type	Atoms
3	A	901	A1IG2	PA-O3P-P-O5'
3	A	901	A1IG2	O4'-C4'-C5'-O5'
3	A	901	A1IG2	O4B-C4B-C5B-O5B

There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	901	A1IG2	2	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 than 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.



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	666/852 (78%)	0.20	2 (0%) 94 92	45, 75, 112, 139	0
2	B	133/485 (27%)	0.31	1 (0%) 86 78	76, 106, 134, 141	0
All	All	799/1337 (59%)	0.22	3 (0%) 92 89	45, 81, 120, 141	0

All (3) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	171	PRO	2.7
1	A	174	VAL	2.1
2	B	375	VAL	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](#)

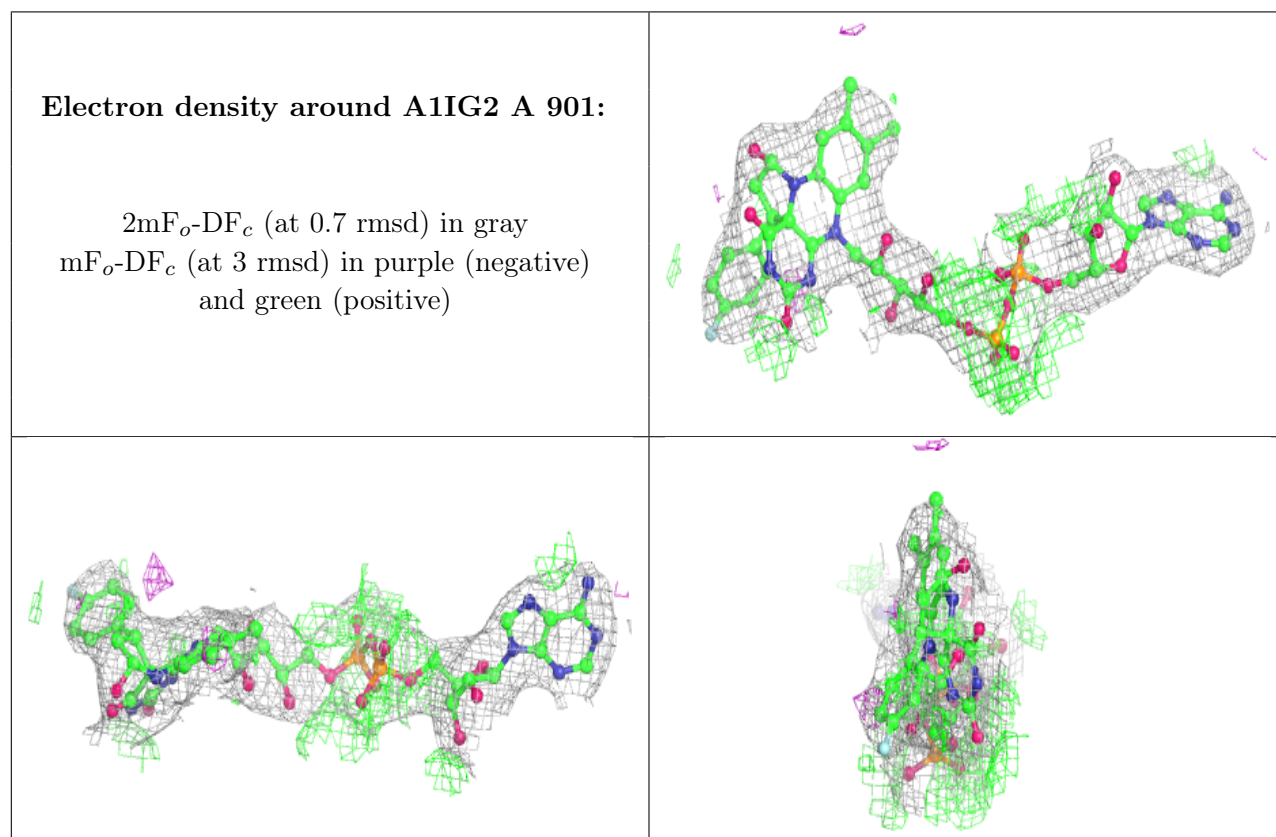
There are no monosaccharides in this entry.

6.4 Ligands [i](#)

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	A1IG2	A	901	64/64	0.98	0.24	41,58,70,93	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.



6.5 Other polymers [i](#)

There are no such residues in this entry.