



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 10, 2026 – 10:36 AM UTC

PDB ID : 2ABI / pdb_00002abi
Title : Crystal structure of the human mineralocorticoid receptor ligand-binding domain bound to deoxycorticosterone
Authors : Huyet, J.; Pinon, G.-M.; Rochel, M.; Mayer, C.; Rafestin-Oblin, M.-E.; Fagart, J.
Deposited on : 2005-07-15
Resolution : 2.33 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 : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtrriage (Phenix) : 2.0
EDS : 3.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

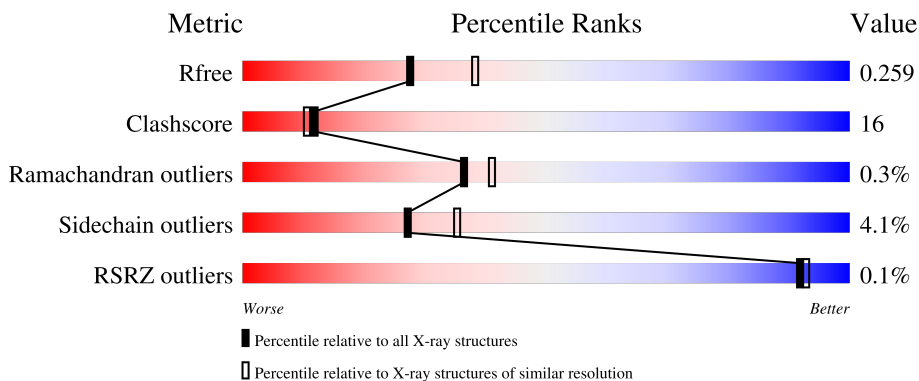
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.33 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}	180053	3031 (2.36-2.32)
Clashscore	190562	3127 (2.36-2.32)
Ramachandran outliers	187476	3095 (2.36-2.32)
Sidechain outliers	187428	3095 (2.36-2.32)
RSRZ outliers	180081	3033 (2.36-2.32)

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	256	
1	B	256	
1	C	256	

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 6075 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.

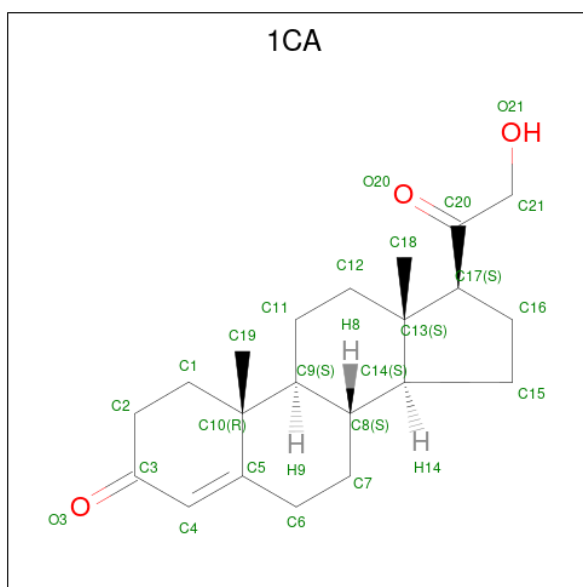
- Molecule 1 is a protein called Mineralocorticoid receptor.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	230	1851	1208	294	335	14	0	0	0
1	B	234	1897	1238	303	342	14	0	0	0
1	C	234	1874	1219	301	341	13	0	0	0

There are 9 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	729	GLY	-	cloning artifact	UNP P08235
A	730	SER	-	cloning artifact	UNP P08235
A	910	ALA	CYS	engineered mutation	UNP P08235
B	729	GLY	-	cloning artifact	UNP P08235
B	730	SER	-	cloning artifact	UNP P08235
B	910	ALA	CYS	engineered mutation	UNP P08235
C	729	GLY	-	cloning artifact	UNP P08235
C	730	SER	-	cloning artifact	UNP P08235
C	910	ALA	CYS	engineered mutation	UNP P08235

- Molecule 2 is DESOXYCORTICOSTERONE (CCD ID: 1CA) (formula: C₂₁H₃₀O₃).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total C O 24 21 3	0	0
2	B	1	Total C O 24 21 3	0	0
2	C	1	Total C O 24 21 3	0	0

- Molecule 3 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	122	Total O 122 122	0	0
3	B	123	Total O 123 123	0	0
3	C	136	Total O 136 136	0	0

ASN	SER	GLY	GLN	S917	W918	R920	F921	K926	L927	L928	V935	L939	C942	S949	V954	P957	A958	M959	L960	V961	E962	I963	L968	P969	K970	L979	H982	ARG	LYS
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4 Data and refinement statistics i

Property	Value	Source
Space group	P 31	Depositor
Cell constants a, b, c, α , β , γ	119.77Å 119.77Å 41.50Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	39.20 – 2.33 39.20 – 2.33	Depositor EDS
% Data completeness (in resolution range)	87.5 (39.20-2.33) 87.6 (39.20-2.33)	Depositor EDS
R_{merge}	0.15	Depositor
R_{sym}	0.08	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.76 (at 2.34Å)	Xtrriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.207 , 0.264 0.206 , 0.259	Depositor DCC
R_{free} test set	2519 reflections (10.11%)	wwPDB-VP
Wilson B-factor (Å ²)	38.0	Xtrriage
Anisotropy	0.080	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 69.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.021 for -h,-k,l 0.035 for h,-h-k,-l 0.000 for -k,-h,-l	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	6075	wwPDB-VP
Average B, all atoms (Å ²)	44.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 26.80 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 2.4659e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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: 1CA

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	0.37	0/1895	0.94	9/2570 (0.4%)
1	B	0.39	0/1942	0.91	4/2629 (0.2%)
1	C	0.37	0/1919	0.92	4/2600 (0.2%)
All	All	0.38	0/5756	0.93	17/7799 (0.2%)

There are no bond length outliers.

The worst 5 of 17 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	879	SER	N-CA-C	6.89	122.53	113.30
1	A	959	MET	N-CA-C	-6.63	104.13	111.36
1	A	746	GLU	CA-C-N	6.47	127.92	119.84
1	A	746	GLU	C-N-CA	6.47	127.92	119.84
1	C	918	TRP	N-CA-C	-6.33	105.60	113.38

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	1851	0	1815	65	0
1	B	1897	0	1879	52	0
1	C	1874	0	1823	61	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	A	24	0	30	4	0
2	B	24	0	30	2	0
2	C	24	0	30	2	0
3	A	122	0	0	2	0
3	B	123	0	0	3	0
3	C	136	0	0	4	0
All	All	6075	0	5607	178	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 16.

The worst 5 of 178 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:B:807:MET:HE1	2:B:2001:1CA:H62	1.57	0.84
1:A:968:LEU:HD23	1:A:969:PRO:HD3	1.60	0.82
1:A:742:LEU:HD23	1:A:870:THR:HG22	1.64	0.80
1:B:827:LEU:HB2	1:B:835:PHE:HB2	1.66	0.78
1:A:742:LEU:HB3	1:A:870:THR:HG21	1.64	0.77

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	112/256 (44%)	106 (95%)	5 (4%)	1 (1%)	14	13
1	B	22/256 (9%)	19 (86%)	3 (14%)	0	100	100
1	C	181/256 (71%)	174 (96%)	7 (4%)	0	100	100
All	All	315/768 (41%)	299 (95%)	15 (5%)	1 (0%)	36	41

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	747	PRO

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	202/234 (86%)	196 (97%)	6 (3%)	36	47
1	B	203/234 (87%)	193 (95%)	10 (5%)	22	28
1	C	203/234 (87%)	194 (96%)	9 (4%)	25	33
All	All	608/702 (87%)	583 (96%)	25 (4%)	27	35

5 of 25 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	919	GLN
1	C	749	ILE
1	C	979	LEU
1	C	743	GLU
1	C	801	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 21 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	779	GLN
1	C	854	GLN
1	C	975	ASN
1	C	898	ASN
1	C	850	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](#)

3 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	1CA	A	1001	-	27,27,27	5.17	16 (59%)	42,43,43	1.48	5 (11%)
2	1CA	C	3001	-	27,27,27	4.66	18 (66%)	42,43,43	1.72	10 (23%)
2	1CA	B	2001	-	27,27,27	4.82	21 (77%)	42,43,43	1.59	6 (14%)

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	1CA	A	1001	-	-	2/6/64/64	0/4/4/4
2	1CA	C	3001	-	-	0/6/64/64	0/4/4/4
2	1CA	B	2001	-	-	0/6/64/64	0/4/4/4

The worst 5 of 55 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1001	1CA	C4-C5	11.44	1.50	1.34
2	B	2001	1CA	C10-C5	10.63	1.73	1.52
2	C	3001	1CA	C18-C13	9.47	1.70	1.54
2	A	1001	1CA	C8-C9	9.46	1.71	1.53

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	3001	1CA	C8-C9	9.01	1.70	1.53

The worst 5 of 21 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	3001	1CA	C17-C13-C14	-5.42	94.06	99.72
2	B	2001	1CA	C2-C3-C4	4.96	124.27	116.73
2	A	1001	1CA	C17-C13-C14	-4.82	94.69	99.72
2	C	3001	1CA	C2-C3-C4	4.17	123.07	116.73
2	B	2001	1CA	C17-C13-C14	-3.84	95.71	99.72

There are no chirality outliers.

All (2) torsion outliers are listed below:

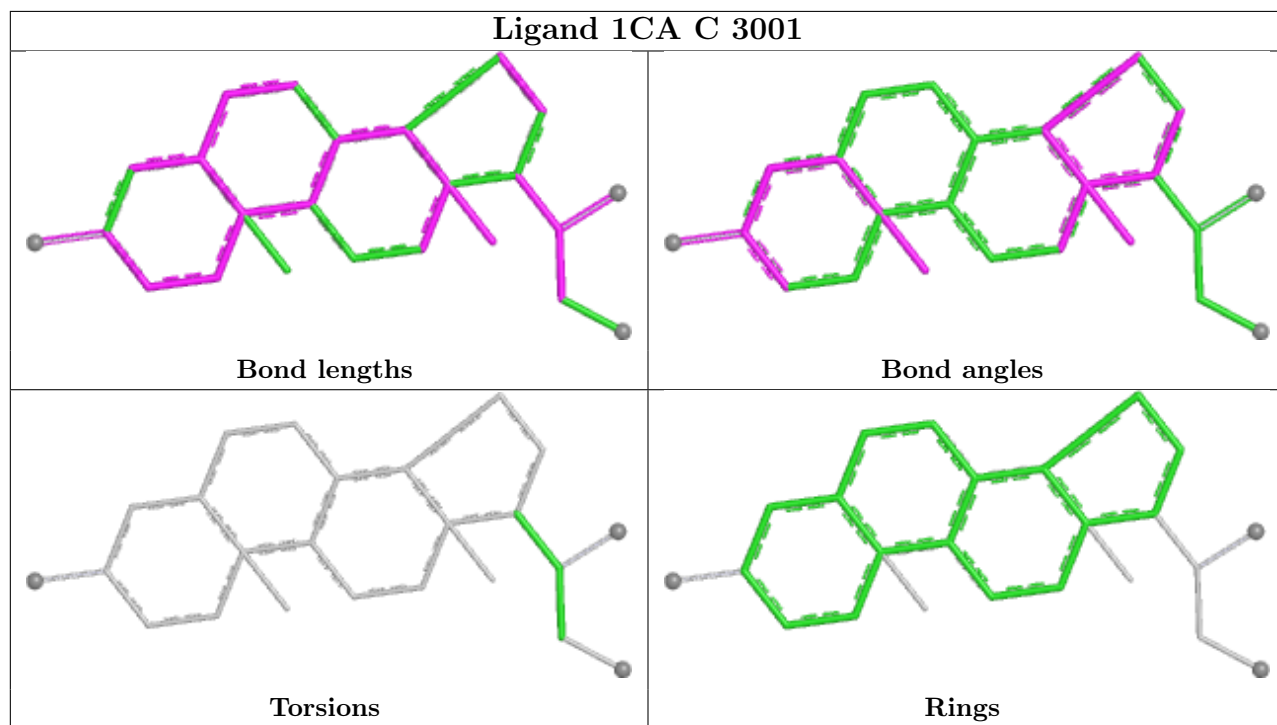
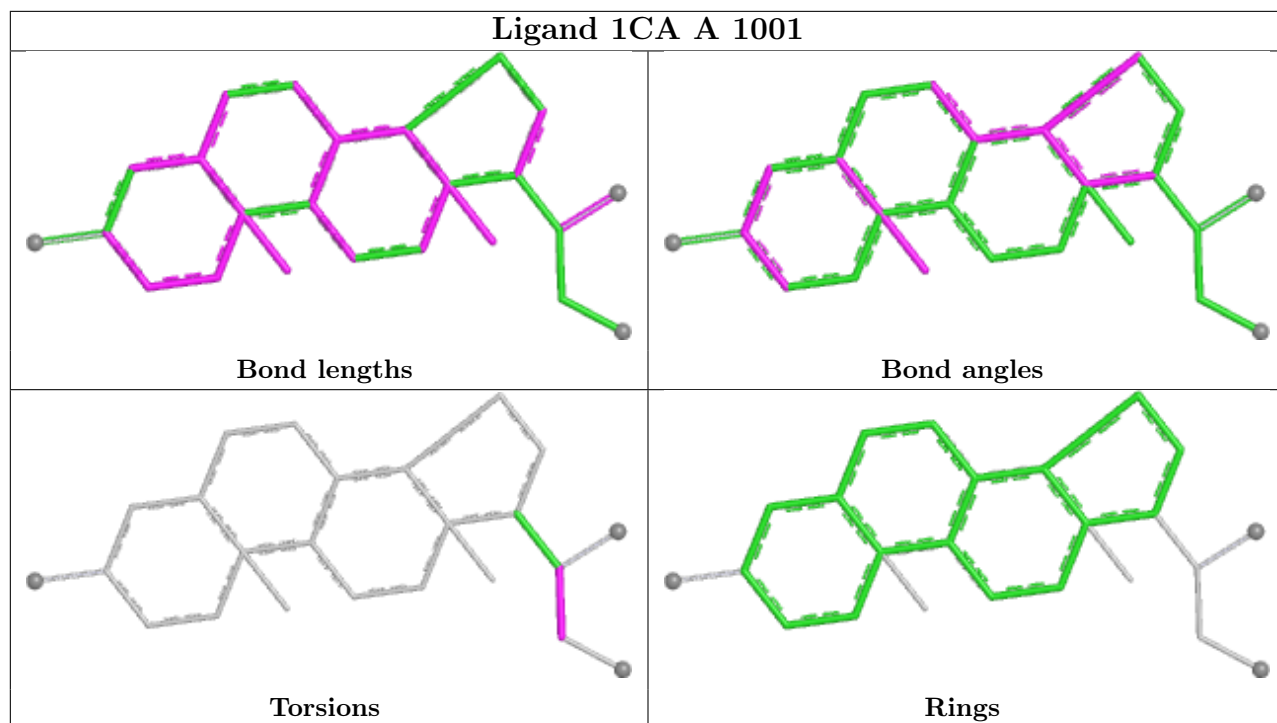
Mol	Chain	Res	Type	Atoms
2	A	1001	1CA	O20-C20-C21-O21
2	A	1001	1CA	C17-C20-C21-O21

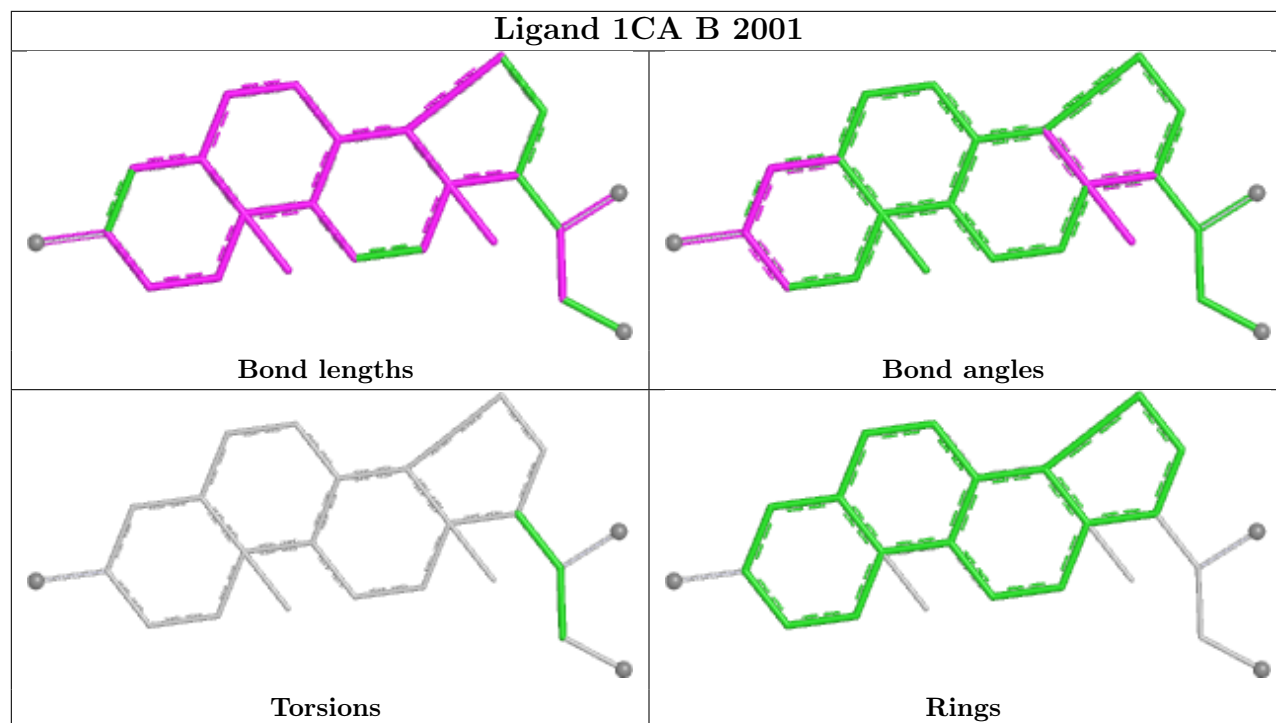
There are no ring outliers.

3 monomers are involved in 8 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1001	1CA	4	0
2	C	3001	1CA	2	0
2	B	2001	1CA	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	230/256 (89%)	0.00	1 (0%) 88 90	28, 44, 65, 72	0
1	B	234/256 (91%)	-0.08	0 100 100	24, 42, 60, 69	0
1	C	234/256 (91%)	-0.07	0 100 100	25, 43, 61, 67	0
All	All	698/768 (90%)	-0.05	1 (0%) 92 93	24, 43, 61, 72	0

All (1) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	971	VAL	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](#)

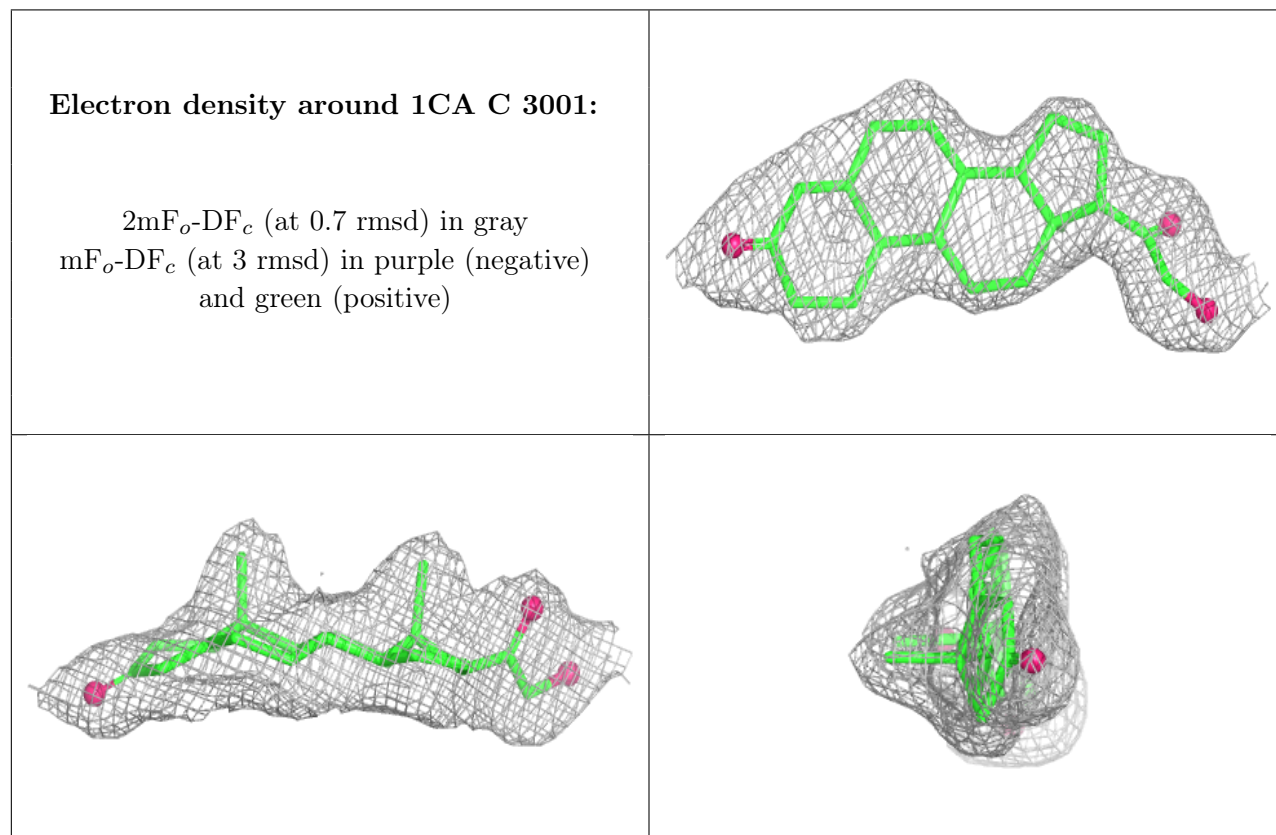
There are no oligosaccharides in this entry.

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.

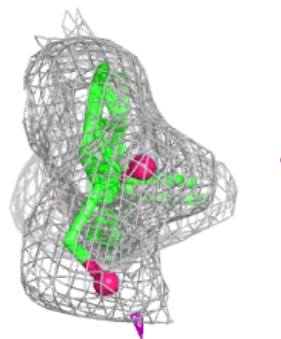
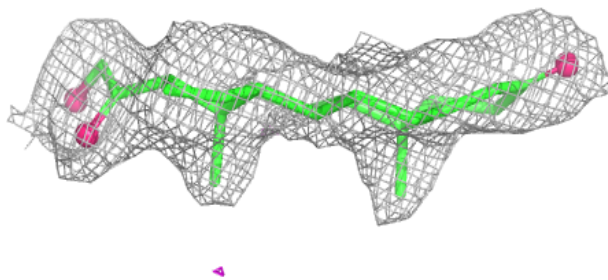
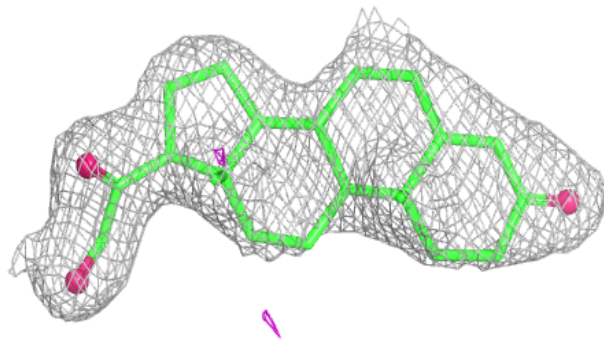
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	1CA	C	3001	24/24	0.91	0.09	25,29,32,34	0
2	1CA	A	1001	24/24	0.93	0.08	28,31,35,37	0
2	1CA	B	2001	24/24	0.94	0.07	22,27,32,35	0

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.

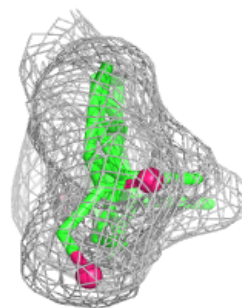
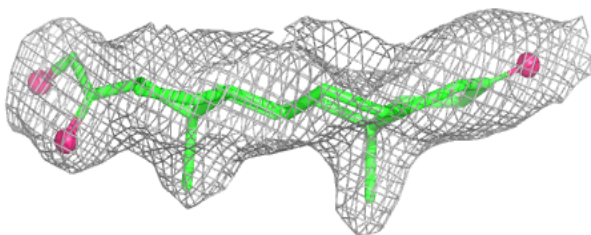
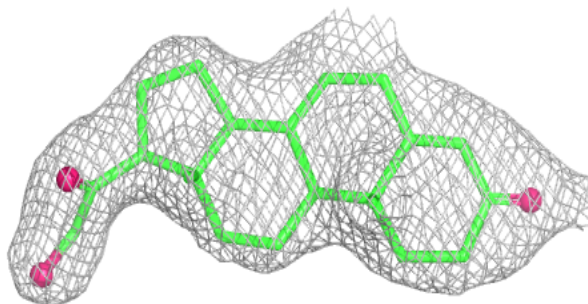


Electron density around 1CA A 1001:

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

**Electron density around 1CA B 2001:**

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



6.5 Other polymers [i](#)

There are no such residues in this entry.