



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 4, 2023 – 06:09 PM EDT

PDB ID : 6MXT
Title : Crystal structure of human beta2 adrenergic receptor bound to salmeterol and Nb71
Authors : Masureel, M.; Zou, Y.; Picard, L.P.; van der Westhuizen, E.; Mahoney, J.P.; Rodrigues, J.P.G.L.M.; Mildorf, T.J.; Dror, R.O.; Shaw, D.E.; Bouvier, M.; Pardon, E.; Steyaert, J.; Sunahara, R.K.; Weis, W.I.; Zhang, C.; Kobilka, B.K.
Deposited on : 2018-10-31
Resolution : 2.96 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
Xtriage (Phenix) : 1.13
EDS : **FAILED**
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.35.1

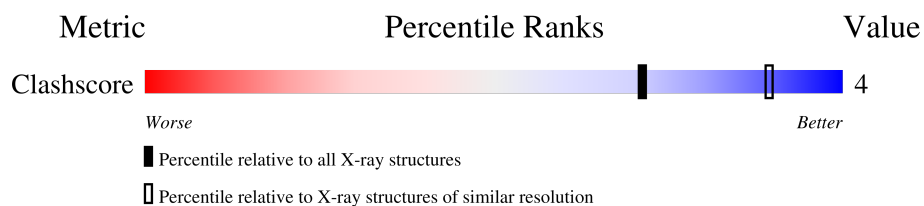
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.96 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))
Clashscore	141614	3462 (3.00-2.92)

2 Entry composition

There are 10 unique types of molecules in this entry. The entry contains 4683 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 Endolysin, Beta-2 adrenergic receptor chimera.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	449	3601	2349	603	627	22	0	1	0

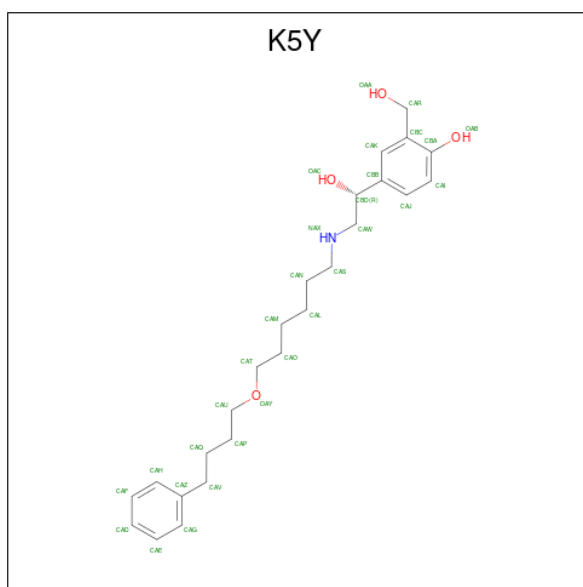
There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	GLY	-	expression tag	UNP D9IEF7
A	53	THR	CYS	conflict	UNP D9IEF7
A	96	ALA	CYS	conflict	UNP D9IEF7
A	161	ALA	-	linker	UNP D9IEF7
A	162	ALA	-	linker	UNP D9IEF7
A	1096	THR	MET	engineered mutation	UNP P07550
A	1098	THR	MET	engineered mutation	UNP P07550
A	1187	GLU	ASN	engineered mutation	UNP P07550

- Molecule 2 is a protein called nanobody Nb71.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	N	122	951	591	174	183	3	0	1	0

- Molecule 3 is salmeterol (three-letter code: K5Y) (formula: C₂₅H₃₇NO₄) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			30	25	1	4		

- Molecule 4 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Mg	0	0
			1	1		

- Molecule 5 is NICKEL (II) ION (three-letter code: NI) (formula: Ni).

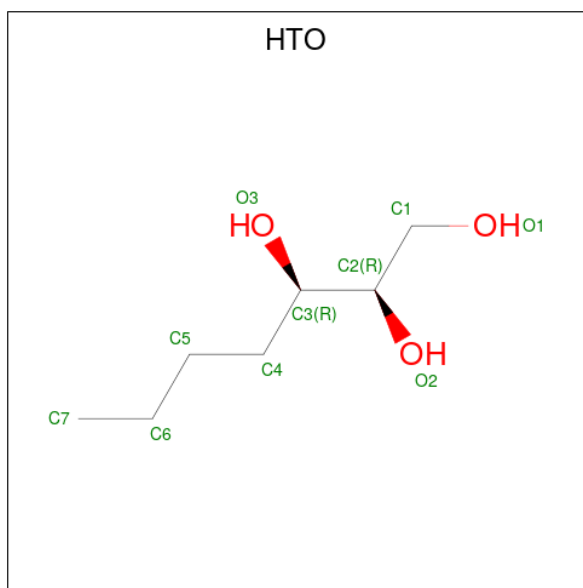
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total	Ni	0	0
			1	1		
5	N	2	Total	Ni	0	0
			2	2		

- Molecule 6 is (2R)-2,3-dihydroxypropyl (9Z)-octadec-9-enoate (three-letter code: OLC) (formula: C₂₁H₄₀O₄).



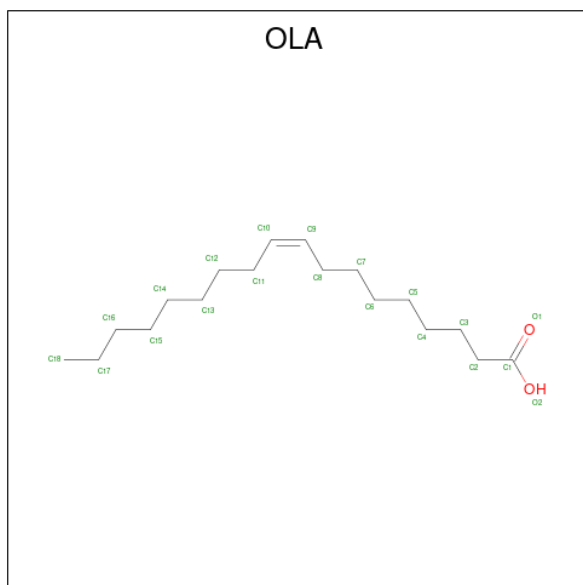
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			25	21	4		

- Molecule 7 is HEPTANE-1,2,3-TRIOL (three-letter code: HTO) (formula: $C_7H_{16}O_3$).



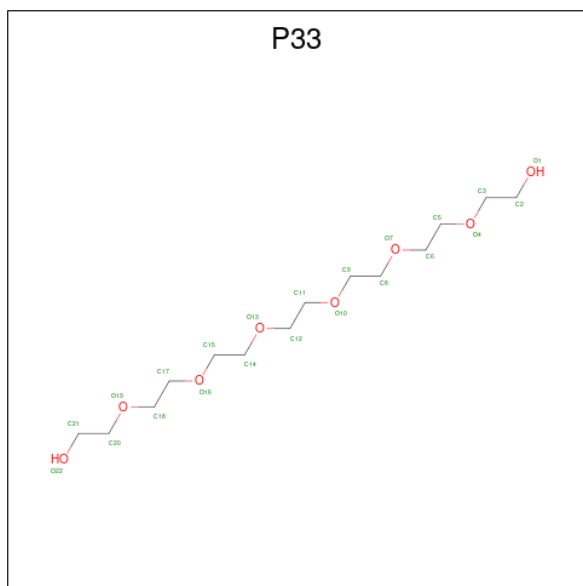
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total	C	O	0	0
			10	7	3		

- Molecule 8 is OLEIC ACID (three-letter code: OLA) (formula: $C_{18}H_{34}O_2$).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	1	Total	C O	0	0
			20	18 2		

- Molecule 9 is 3,6,9,12,15,18-HEXAOXAIICOSANE-1,20-DIOL (three-letter code: P33) (formula: $C_{14}H_{30}O_8$).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	1	Total	C O	0	0
			22	14 8		

- Molecule 10 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
10	A	17	Total O 17 17	0	0
10	N	3	Total O 3 3	0	0

SEQUENCE-PLOTS INFOmissingINFO

3 Data and refinement statistics

EDS failed to run properly - this section is therefore incomplete.

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	178.68Å 52.59Å 125.92Å 90.00° 123.86° 90.00°	Depositor
Resolution (Å)	28.52 – 2.96	Depositor
% Data completeness (in resolution range)	90.8 (28.52-2.96)	Depositor
R_{merge}	0.17	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.51 (at 2.95Å)	Xtrriage
Refinement program	PHENIX 1.9_1692	Depositor
R, R_{free}	0.205 , 0.245	Depositor
Wilson B-factor (Å ²)	52.5	Xtrriage
Anisotropy	0.088	Xtrriage
L-test for twinning ²	$\langle L \rangle = 0.46$, $\langle L^2 \rangle = 0.29$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	4683	wwPDB-VP
Average B, all atoms (Å ²)	53.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.15% 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.

4 Model quality

4.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: YCM, K5Y, HTO, MG, NI, P33, OLA, OLC

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	0.21	0/3663	0.36	0/4971
2	N	0.20	0/980	0.36	0/1331
All	All	0.21	0/4643	0.36	0/6302

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

4.2 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	3601	0	3671	24	0
2	N	951	0	883	8	0
3	A	30	0	0	1	0
4	A	1	0	0	0	0
5	A	1	0	0	0	0
5	N	2	0	0	0	0
6	A	25	0	40	1	0
7	A	10	0	16	2	0
8	A	20	0	33	1	0
9	A	22	0	30	1	0
10	A	17	0	0	0	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
10	N	3	0	0	0	0
All	All	4683	0	4673	33	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 4.

All (33) 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:1164:THR:HG22	8:A:1406:OLA:H121	1.67	0.76
1:A:125:TRP:HB3	1:A:153:ARG:HA	1.76	0.68
2:N:99:TRP:HB3	2:N:103:SER:HB2	1.85	0.59
2:N:34:LEU:HD13	2:N:78:VAL:HB	1.83	0.59
1:A:1205:ILE:HA	1:A:1209:TYR:HB2	1.87	0.56
1:A:1187:GLU:HG3	1:A:1189:THR:H	1.74	0.53
1:A:124:ARG:HD2	1:A:127:GLU:HG3	1.89	0.53
1:A:26:ILE:HG21	1:A:45:LEU:HD13	1.92	0.52
1:A:1070:TYR:O	1:A:1073:THR:OG1	2.29	0.51
1:A:10:GLU:OE2	7:A:1405:HTO:O3	2.31	0.48
1:A:1169:ILE:HA	1:A:1174:TYR:CD1	2.49	0.47
6:A:1404:OLC:H13A	6:A:1404:OLC:H16A	1.64	0.47
1:A:1160:VAL:O	1:A:1164:THR:HG23	2.14	0.47
1:A:1203:SER:HA	1:A:1206:VAL:HG12	1.96	0.47
2:N:33[B]:GLU:HG3	2:N:52:THR:HA	1.96	0.46
1:A:34:LYS:HE2	9:A:1407:P33:H51	1.97	0.46
1:A:1034:VAL:O	1:A:1038:ILE:HG12	2.16	0.45
2:N:12:VAL:HG21	2:N:85:LEU:HD12	1.99	0.45
1:A:1167:LEU:HB3	1:A:1168:PRO:HD3	1.99	0.45
1:A:87:TYR:CZ	1:A:95:ARG:HD3	2.52	0.44
2:N:12:VAL:H	2:N:118:HIS:CE1	2.36	0.43
1:A:89:SER:OG	1:A:123:LYS:NZ	2.50	0.43
1:A:1113:ASP:OD1	3:A:1401:K5Y:OAC	2.36	0.43
1:A:1036:MET:HA	1:A:1039:VAL:HG12	2.01	0.43
1:A:1296:HIS:CE1	1:A:1297:VAL:HG13	2.55	0.42
1:A:1270:LYS:HE2	1:A:1270:LYS:HB3	1.93	0.41
1:A:1310:LEU:O	1:A:1314:ILE:HG12	2.20	0.41
2:N:82:MET:HE1	2:N:112:VAL:HG21	2.02	0.41
2:N:64:LYS:HE3	2:N:64:LYS:HB2	1.83	0.41
2:N:12:VAL:HG13	2:N:114:VAL:HG22	2.01	0.41
1:A:104:GLN:HG3	7:A:1405:HTO:H41	2.02	0.41
1:A:113:PHE:HB3	1:A:116:SER:OG	2.20	0.41

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1070:TYR:HE2	1:A:1154:ILE:HG12	1.86	0.41

There are no symmetry-related clashes.

4.3 Torsion angles [i](#)

4.3.1 Protein backbone [i](#)

There are no protein backbone outliers to report in this entry.

4.3.2 Protein sidechains [i](#)

There are no protein residues with a non-rotameric sidechain to report in this entry.

4.3.3 RNA [i](#)

There are no RNA molecules in this entry.

4.4 Non-standard residues in protein, DNA, RNA chains [i](#)

2 non-standard protein/DNA/RNA residues are modelled in this entry.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

4.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

4.6 Ligand geometry [i](#)

Of 9 ligands modelled in this entry, 4 are monoatomic - leaving 5 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

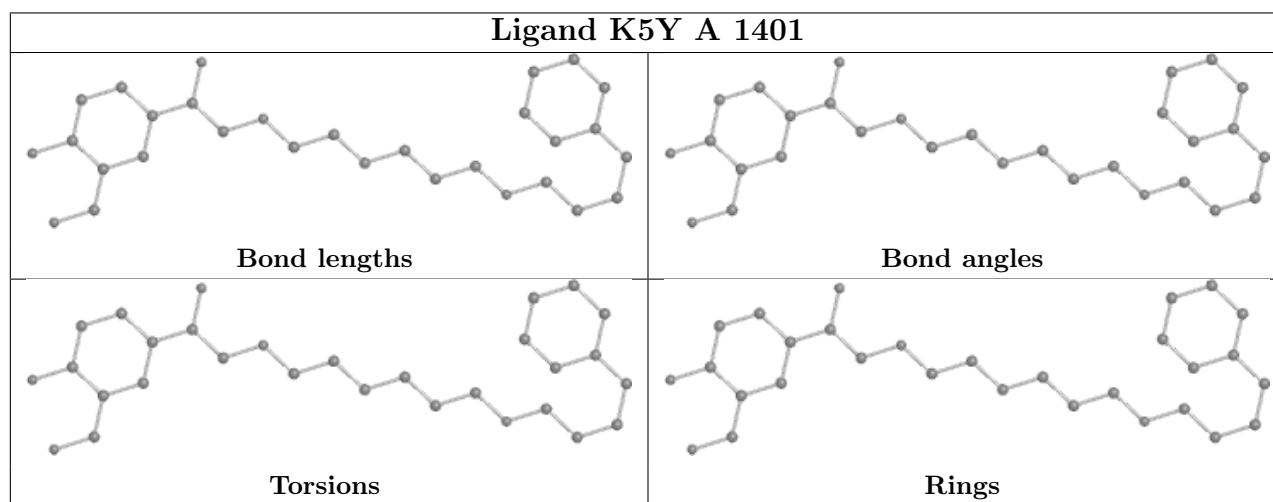
There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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.



4.7 Other polymers [i](#)

There are no such residues in this entry.

4.8 Polymer linkage issues

There are no chain breaks in this entry.

5 Fit of model and data

5.1 Protein, DNA and RNA chains

EDS failed to run properly - this section is therefore empty.

5.2 Non-standard residues in protein, DNA, RNA chains

EDS failed to run properly - this section is therefore empty.

5.3 Carbohydrates

EDS failed to run properly - this section is therefore empty.

5.4 Ligands

EDS failed to run properly - this section is therefore empty.

5.5 Other polymers

EDS failed to run properly - this section is therefore empty.