



# wwPDB X-ray Structure Validation Summary Report i

Feb 28, 2014 – 01:12 PM GMT

PDB ID : 1P8D  
Title : X-Ray Crystal Structure of LXR Ligand Binding Domain with 24(S),25-epoxycholesterol  
Authors : Williams, S.; Bledsoe, R.K.; Collins, J.L.; Boggs, S.; Lambert, M.H.; Miller, A.B.; Moore, J.; McKee, D.D.; Moore, L.; Nichols, J.; Parks, D.; Watson, M.; Wisely, B.; Willson, T.M.  
Deposited on : 2003-05-06  
Resolution : 2.80 Å(reported)

This is a wwPDB validation summary report for a publicly released PDB entry.  
We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)  
A user guide is available at <http://wwpdb.org/ValidationPDFNotes.html>

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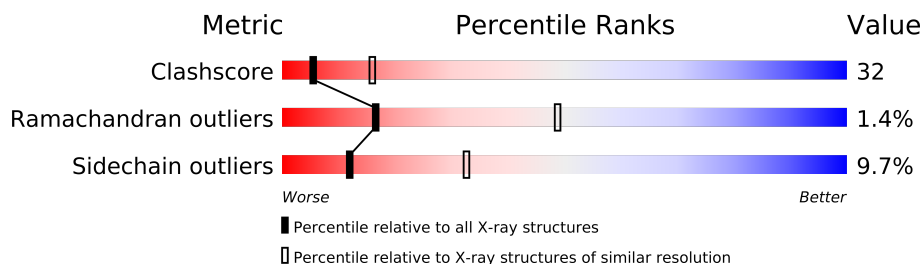
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.15 2013  
Xtriage (Phenix) : **NOT EXECUTED**  
EDS : **NOT EXECUTED**  
Percentile statistics : 21963  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)  
Validation Pipeline (wwPDB-VP) : stable22683

# 1 Overall quality at a glance

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.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	79885	2295 (2.80-2.80)
Ramachandran outliers	78287	2252 (2.80-2.80)
Sidechain outliers	78261	2254 (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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	250	
1	B	250	
2	C	25	
2	D	25	

## 2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 4273 atoms, of which 0 are hydrogen and 0 are deuterium.

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 Oxysterols receptor LXR-beta.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	240	Total	C	N	O	S	0	0	0
			1945	1242	343	353	7			
1	B	239	Total	C	N	O	S	0	0	0
			1933	1235	340	351	7			

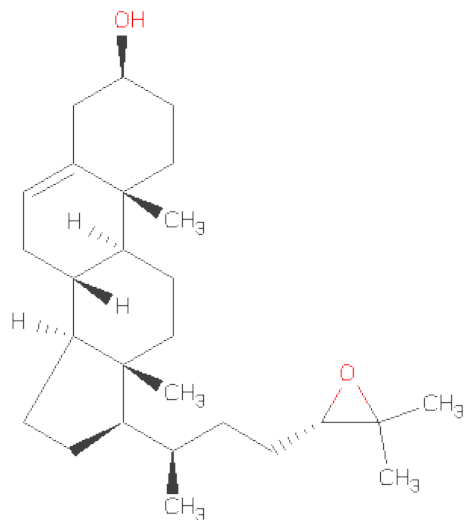
There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	212	GLY	-	CLONING ARTIFACT	UNP P55055
A	213	SER	-	CLONING ARTIFACT	UNP P55055
B	212	GLY	-	CLONING ARTIFACT	UNP P55055
B	213	SER	-	CLONING ARTIFACT	UNP P55055

- Molecule 2 is a protein called nuclear receptor coactivator 1 isoform 3.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	C	16	Total	C	N	O	0	0	0
			128	81	28	19			
2	D	13	Total	C	N	O	0	0	0
			110	69	25	16			

- Molecule 3 is 17-[3-(3,3-DIMETHYL-OXIRANYL)-1-METHYL-PROPYL]-10,13-DIMETHYL-2,3,4,7,8,9,10,11,12,13,14,15,16,17-TETRADECAHYDRO-1H-CYCLOPENTA[A]PHENANTHREN-3-OL (three-letter code: CO1) (formula: C<sub>27</sub>H<sub>44</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			29	27	2		
3	B	1	Total	C	O	0	0
			29	27	2		

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	51	Total	O	0	0
			51	51		
4	B	44	Total	O	0	0
			44	44		
4	C	3	Total	O	0	0
			3	3		
4	D	1	Total	O	0	0
			1	1		

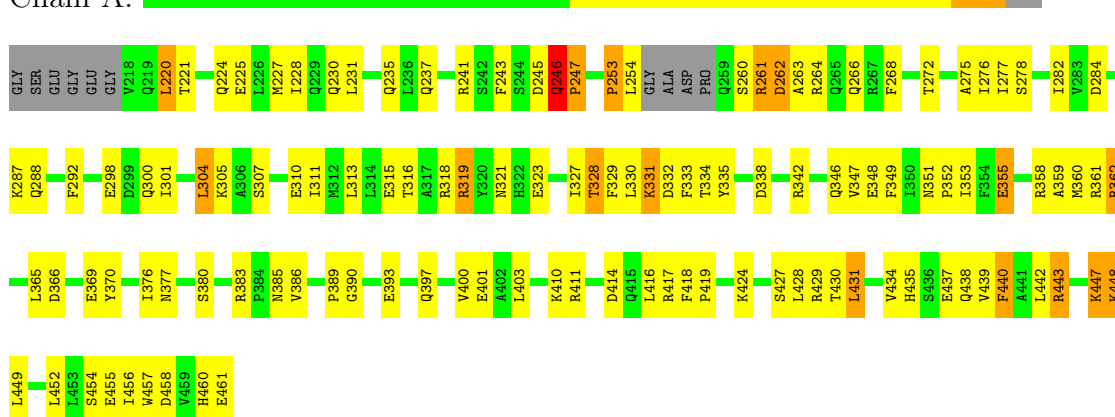
### 3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

Note EDS was not executed.

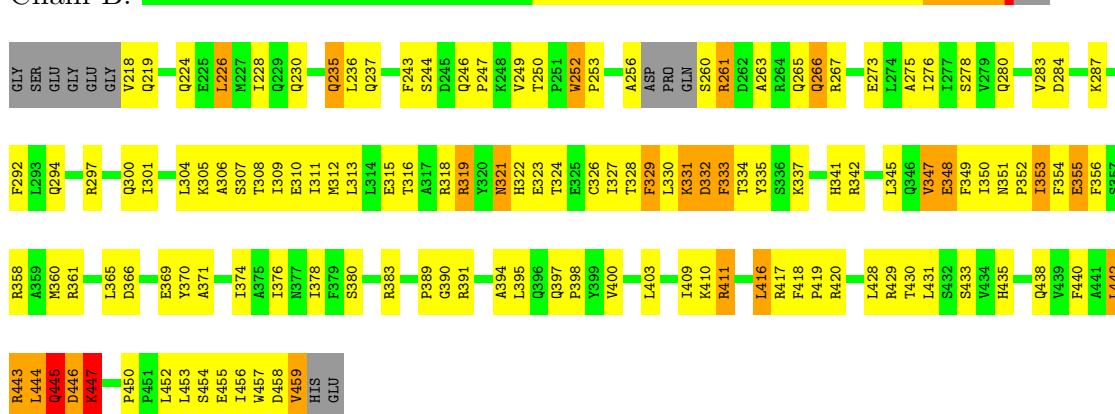
- Molecule 1: Oxysterols receptor LXR-beta

Chain A:



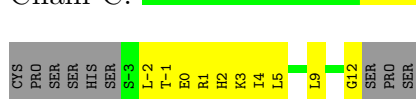
- Molecule 1: Oxysterols receptor LXR-beta

Chain B:



- Molecule 2: nuclear receptor coactivator 1 isoform 3

Chain C:



- Molecule 2: nuclear receptor coactivator 1 isoform 3

Chain D: 

CYS	PRO	SER	SER	HIS	SER	SER	LEU	THR	GLU	R1	I4	L5	H6	R7	L8	L9	Q10	E11	G12	S13	PRO	SER
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## 4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section will therefore be incomplete.

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	71.17Å 120.01Å 147.56Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 2.80	Depositor
% Data completeness (in resolution range)	98.5 (20.00-2.80)	Depositor
$R_{merge}$	0.10	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	CNS	Depositor
R, $R_{free}$	0.214 , 0.277	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	4273	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	29.0	wwPDB-VP

## 5 Model quality ⓘ

### 5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: CO1

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	0.70	0/1983	0.80	1/2682 (0.0%)
1	B	0.73	1/1970 (0.1%)	0.88	5/2665 (0.2%)
2	C	0.32	0/129	0.69	0/171
2	D	0.34	0/111	0.60	0/146
All	All	0.70	1/4193 (0.0%)	0.83	6/5664 (0.1%)

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
1	B	0	1
All	All	0	2

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	252	TRP	NE1-CE2	8.71	1.48	1.37

The worst 5 of 6 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	331	LYS	CA-C-N	-7.65	100.37	117.20
1	B	445	GLN	N-CA-C	-6.45	93.58	111.00
1	B	331	LYS	O-C-N	6.24	132.69	122.70
1	B	447	LYS	N-CA-C	5.61	126.13	111.00
1	A	319	ARG	NE-CZ-NH1	-5.27	117.67	120.30



There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	335	TYR	Sidechain
1	B	331	LYS	Peptide

## 5.2 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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1945	0	1953	132	0
1	B	1933	0	1950	133	0
2	C	128	0	133	12	0
2	D	110	0	118	10	0
3	A	29	0	43	4	0
3	B	29	0	43	4	0
4	A	51	0	0	6	0
4	B	44	0	0	2	0
4	C	3	0	0	2	0
4	D	1	0	0	0	0
All	All	4273	0	4240	271	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 32.

The worst 5 of 271 close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:B:319:ARG:HG3	1:B:319:ARG:HH11	1.14	1.12
1:B:267:ARG:HE	1:B:342:ARG:HB3	1.24	1.01
1:A:347:VAL:HG22	1:A:351:ASN:HD21	1.31	0.94
1:A:243:PHE:HB3	1:A:330:LEU:HD21	1.51	0.91
1:B:443:ARG:HH11	1:B:443:ARG:HG3	1.35	0.91

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	236/250 (94%)	216 (92%)	17 (7%)	3 (1%)	18	51
1	B	235/250 (94%)	222 (94%)	11 (5%)	2 (1%)	25	63
2	C	14/25 (56%)	12 (86%)	1 (7%)	1 (7%)	2	4
2	D	11/25 (44%)	9 (82%)	1 (9%)	1 (9%)	1	2
All	All	496/550 (90%)	459 (92%)	30 (6%)	7 (1%)	16	49

5 of 7 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	332	ASP
2	C	-1	THR
2	D	11	GLU
1	A	247	PRO
1	B	329	PHE

### 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	210/220 (96%)	192 (91%)	18 (9%)	15	40
1	B	209/220 (95%)	185 (88%)	24 (12%)	8	23
2	C	12/24 (50%)	11 (92%)	1 (8%)	16	42
2	D	11/24 (46%)	11 (100%)	0	100	100
All	All	442/488 (91%)	399 (90%)	43 (10%)	12	32

5 of 43 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	235	GLN
1	B	319	ARG
1	B	446	ASP
1	B	244	SER
1	B	261	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 18 such sidechains are listed below:

Mol	Chain	Res	Type
1	A	387	GLN
1	A	415	GLN
1	B	321	ASN
1	A	341	HIS
1	A	351	ASN

### 5.3.3 RNA ⓘ

There are no RNA chains in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

## 5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

## 5.6 Ligand geometry ⓘ

2 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
3	CO1	A	108	-	33,33,33	2.17	13 (39%)	54,54,54	1.56	8 (14%)
3	CO1	B	109	-	33,33,33	2.12	15 (45%)	54,54,54	1.66	13 (24%)

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	CO1	A	108	-	-	0/9/75/75	0/0/5/5
3	CO1	B	109	-	-	0/9/75/75	0/0/5/5

The worst 5 of 28 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	108	CO1	C7-C14	4.35	1.62	1.52
3	A	108	CO1	C17-C10	4.19	1.62	1.54
3	B	109	CO1	C17-C10	3.99	1.62	1.54
3	A	108	CO1	C7-C3	3.99	1.63	1.56
3	B	109	CO1	C1-C2	3.69	1.61	1.53

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

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	109	CO1	O27-C25-C23	4.24	124.95	117.67
3	A	108	CO1	O27-C25-C23	4.12	124.75	117.67
3	B	109	CO1	C1-C4-C9	3.69	119.02	112.84
3	A	108	CO1	C1-C4-C9	3.65	118.94	112.84
3	B	109	CO1	C18-C14-C7	3.45	121.72	116.42

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

## 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 ⓘ

EDS was not executed - this section will therefore be empty.

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

EDS was not executed - this section will therefore be empty.

### 6.3 Carbohydrates ⓘ

EDS was not executed - this section will therefore be empty.

### 6.4 Ligands ⓘ

EDS was not executed - this section will therefore be empty.

### 6.5 Other polymers ⓘ

EDS was not executed - this section will therefore be empty.