



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 28, 2025 – 02:07 PM EDT

PDB ID : 9O41 / pdb_00009o41
Title : Crystal structure of the L411A mutant of pregnane X receptor ligand binding domain (apo form)
Authors : Huber, A.D.; Garcia-Maldonado, E.; Miller, D.J.; Chen, T.
Deposited on : 2025-04-08
Resolution : 2.05 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	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
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)	:	2.46

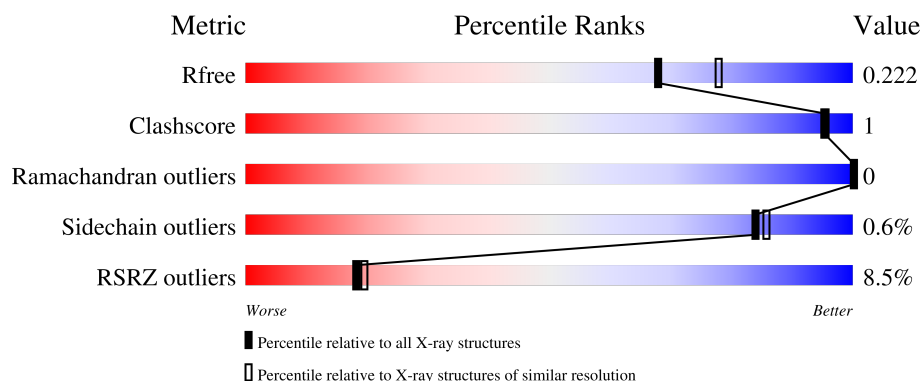
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.05 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}	164625	2096 (2.04-2.04)
Clashscore	180529	2229 (2.04-2.04)
Ramachandran outliers	177936	2217 (2.04-2.04)
Sidechain outliers	177891	2217 (2.04-2.04)
RSRZ outliers	164620	2096 (2.04-2.04)

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	355	<div> <div>6%</div> <div> <div></div> <div>79%</div> <div>••</div> <div>18%</div> </div> </div>
1	B	355	<div> <div>8%</div> <div> <div></div> <div>81%</div> <div>•</div> <div>17%</div> </div> </div>

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 4892 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 Pregnane X receptor ligand binding domain tethered to steroid receptor coactivator-1 peptide.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	292	Total	C	N	O	S	0	4	0
			2381	1529	411	421	20			
1	B	293	Total	C	N	O	S	0	3	0
			2353	1507	406	421	19			

There are 44 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	119	MET	-	initiating methionine	UNP O75469
A	120	LYS	-	expression tag	UNP O75469
A	121	LYS	-	expression tag	UNP O75469
A	122	GLY	-	expression tag	UNP O75469
A	123	HIS	-	expression tag	UNP O75469
A	124	HIS	-	expression tag	UNP O75469
A	125	HIS	-	expression tag	UNP O75469
A	126	HIS	-	expression tag	UNP O75469
A	127	HIS	-	expression tag	UNP O75469
A	128	HIS	-	expression tag	UNP O75469
A	129	GLY	-	expression tag	UNP O75469
A	411	ALA	LEU	engineered mutation	UNP O75469
A	432C	SER	-	linker	UNP O75469
A	432D	GLY	-	linker	UNP O75469
A	432E	GLY	-	linker	UNP O75469
A	432F	SER	-	linker	UNP O75469
A	432G	GLY	-	linker	UNP O75469
A	432H	GLY	-	linker	UNP O75469
A	432I	SER	-	linker	UNP O75469
A	432J	SER	-	linker	UNP O75469
A	432K	HIS	-	linker	UNP O75469
A	432L	SER	-	linker	UNP O75469
B	119	MET	-	initiating methionine	UNP O75469
B	120	LYS	-	expression tag	UNP O75469

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Chain	Residue	Modelled	Actual	Comment	Reference
B	121	LYS	-	expression tag	UNP O75469
B	122	GLY	-	expression tag	UNP O75469
B	123	HIS	-	expression tag	UNP O75469
B	124	HIS	-	expression tag	UNP O75469
B	125	HIS	-	expression tag	UNP O75469
B	126	HIS	-	expression tag	UNP O75469
B	127	HIS	-	expression tag	UNP O75469
B	128	HIS	-	expression tag	UNP O75469
B	129	GLY	-	expression tag	UNP O75469
B	411	ALA	LEU	engineered mutation	UNP O75469
B	431D	SER	-	linker	UNP O75469
B	431E	GLY	-	linker	UNP O75469
B	431F	GLY	-	linker	UNP O75469
B	431G	SER	-	linker	UNP O75469
B	431H	GLY	-	linker	UNP O75469
B	431I	GLY	-	linker	UNP O75469
B	431J	SER	-	linker	UNP O75469
B	431K	SER	-	linker	UNP O75469
B	431L	HIS	-	linker	UNP O75469
B	431M	SER	-	linker	UNP O75469

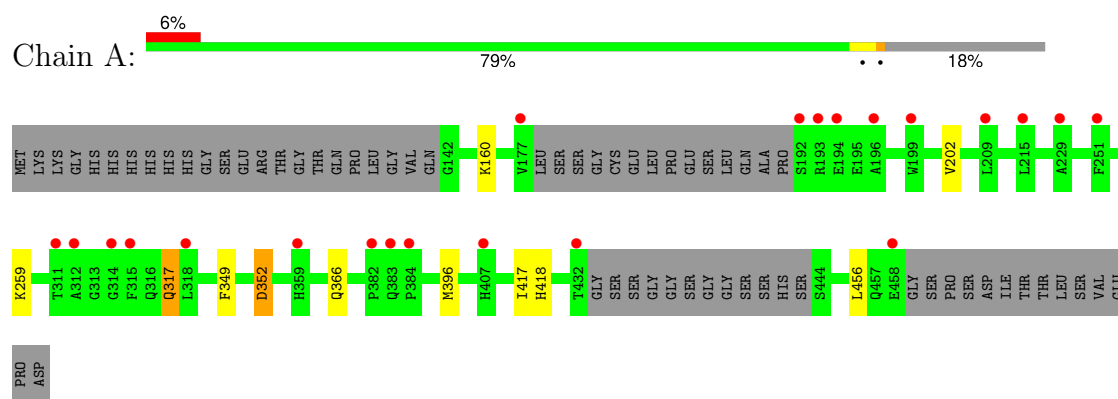
- Molecule 2 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	86	Total O 86 86	0	0
2	B	72	Total O 72 72	0	0

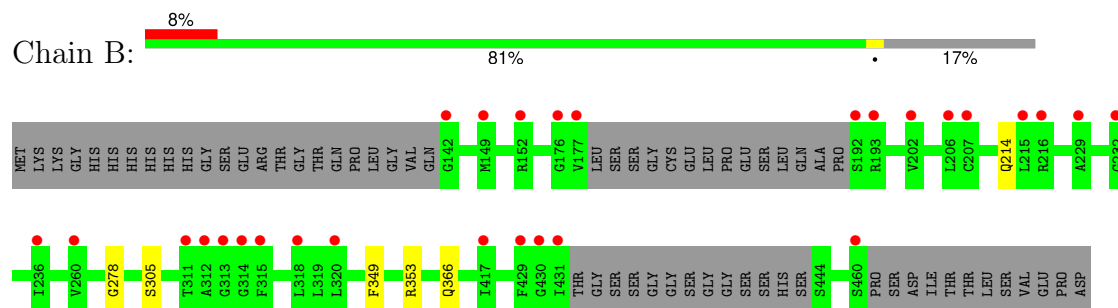
3 Residue-property plots [i](#)

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: Pregnane X receptor ligand binding domain tethered to steroid receptor coactivator-1 peptide



- Molecule 1: Pregnane X receptor ligand binding domain tethered to steroid receptor coactivator-1 peptide



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	85.22Å 89.27Å 105.28Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	45.34 – 2.05 45.34 – 2.05	Depositor EDS
% Data completeness (in resolution range)	99.7 (45.34-2.05) 99.7 (45.34-2.05)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.06	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.15 (at 2.05Å)	Xtriage
Refinement program	PHENIX 1.21.1_5286	Depositor
R, R_{free}	0.203 , 0.222 0.203 , 0.222	Depositor DCC
R_{free} test set	2505 reflections (4.90%)	wwPDB-VP
Wilson B-factor (Å ²)	38.9	Xtriage
Anisotropy	0.101	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 36.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.023 for k,h,-l	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	4892	wwPDB-VP
Average B, all atoms (Å ²)	50.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.06% 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](#)

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	0.38	0/2434	0.48	0/3279
1	B	0.35	0/2405	0.41	0/3243
All	All	0.37	0/4839	0.45	0/6522

There are no bond length outliers.

There are no bond angle outliers.

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	2381	0	2359	7	0
1	B	2353	0	2293	3	0
2	A	86	0	0	1	0
2	B	72	0	0	0	0
All	All	4892	0	4652	10	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 1.

All (10) 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:259:LYS:HD2	1:A:456:LEU:HA	1.82	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:278:GLY:HA3	1:B:353:ARG:HD2	1.93	0.51
1:A:202:VAL:HG11	1:A:417:ILE:HD11	1.95	0.49
1:A:352:ASP:OD1	1:A:352:ASP:N	2.43	0.48
1:A:417:ILE:HG13	1:A:418:HIS:N	2.29	0.47
1:A:349:PHE:O	1:A:366:GLN:HB2	2.15	0.47
1:B:214:GLN:HB2	1:B:305:SER:HB2	1.98	0.46
1:A:160:LYS:NZ	2:A:505:HOH:O	2.50	0.42
1:B:349:PHE:O	1:B:366:GLN:HB2	2.20	0.42
1:A:317:GLN:HE21	1:A:317:GLN:HB2	1.65	0.41

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	290/355 (82%)	283 (98%)	7 (2%)	0	100	100
1	B	290/355 (82%)	285 (98%)	5 (2%)	0	100	100
All	All	580/710 (82%)	568 (98%)	12 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	256/312 (82%)	253 (99%)	3 (1%)	67	68
1	B	248/312 (80%)	248 (100%)	0	100	100
All	All	504/624 (81%)	501 (99%)	3 (1%)	84	86

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	317	GLN
1	A	352	ASP
1	A	396	MET

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	289	ASN
1	A	317	GLN
1	A	368	GLN
1	A	380	ASN
1	A	406	GLN
1	A	453	HIS
1	A	457	GLN
1	B	201	GLN
1	B	214	GLN
1	B	289	ASN
1	B	334	GLN
1	B	406	GLN

5.3.3 RNA ⓘ

There are no RNA molecules 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 oligosaccharides in this entry.

5.6 Ligand geometry

There are no ligands in this entry.

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 [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	292/355 (82%)	0.46	22 (7%)	22 24	15, 45, 86, 112	4 (1%)
1	B	293/355 (82%)	0.50	28 (9%)	15 16	15, 48, 88, 110	3 (1%)
All	All	585/710 (82%)	0.48	50 (8%)	18 19	15, 47, 88, 112	7 (1%)

All (50) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	177	VAL	5.0
1	A	177	VAL	4.4
1	B	431	ILE	3.9
1	B	460	SER	3.9
1	B	312	ALA	3.8
1	B	207	CYS	3.6
1	A	315	PHE	3.6
1	B	430	GLY	3.5
1	A	384	PRO	3.4
1	B	215	LEU	3.4
1	B	192	SER	3.3
1	A	311	THR	3.2
1	B	232	GLY	3.2
1	A	359[A]	HIS	3.1
1	A	209	LEU	3.1
1	A	312	ALA	3.1
1	B	429	PHE	3.0
1	B	417	ILE	2.9
1	B	216	ARG	2.9
1	B	311	THR	2.9
1	A	458	GLU	2.7
1	A	229	ALA	2.6
1	B	229	ALA	2.6
1	A	383	GLN	2.5

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Mol	Chain	Res	Type	RSRZ
1	B	318	LEU	2.5
1	B	193	ARG	2.5
1	A	192	SER	2.5
1	B	152	ARG	2.5
1	B	313	GLY	2.4
1	A	215	LEU	2.4
1	B	149	MET	2.3
1	B	320	LEU	2.3
1	A	407[A]	HIS	2.3
1	A	432	THR	2.3
1	B	202	VAL	2.3
1	A	199	TRP	2.3
1	A	193	ARG	2.3
1	A	318	LEU	2.2
1	B	314	GLY	2.2
1	B	176	GLY	2.2
1	A	382	PRO	2.1
1	A	194	GLU	2.1
1	A	251	PHE	2.1
1	B	206	LEU	2.1
1	B	236	ILE	2.1
1	A	196	ALA	2.1
1	B	142	GLY	2.1
1	B	315	PHE	2.1
1	B	260	VAL	2.0
1	A	314	GLY	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 oligosaccharides in this entry.

6.4 Ligands [i](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.