



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 1, 2014 – 04:42 AM GMT

PDB ID : 4L9I  
Title : Bovine G Protein Coupled Receptor Kinase 1 in Complex with Paroxetine  
Authors : Homan, K.T.; Tesmer, J.J.G.  
Deposited on : 2013-06-18  
Resolution : 2.32 Å(reported)

This is a full wwPDB validation 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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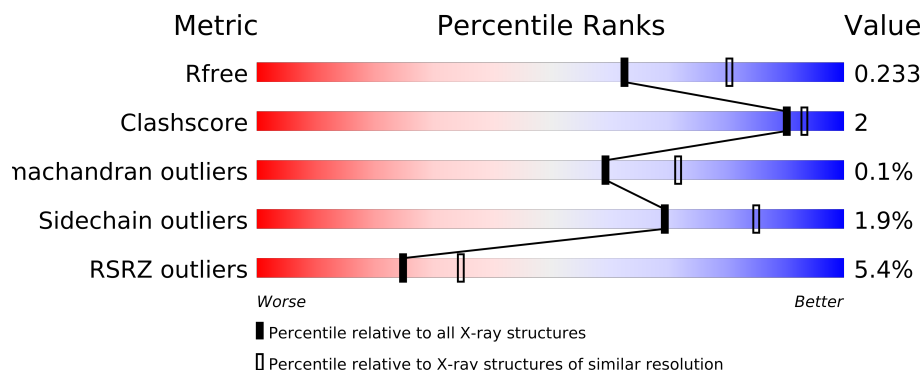
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.15 2013  
Xtriage (Phenix) : dev-1323  
EDS : stable22639  
Percentile statistics : 21963  
Refmac : 5.8.0049  
CCP4 : 6.3.0 (Settle)  
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 2.32 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))
$R_{free}$	66092	3293 (2.34-2.30)
Clashscore	79885	4097 (2.34-2.30)
Ramachandran outliers	78287	4055 (2.34-2.30)
Sidechain outliers	78261	4054 (2.34-2.30)
RSRZ outliers	66119	3294 (2.34-2.30)

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.

Mol	Chain	Length	Quality of chain
1	A	504	
1	B	504	

## 2 Entry composition i

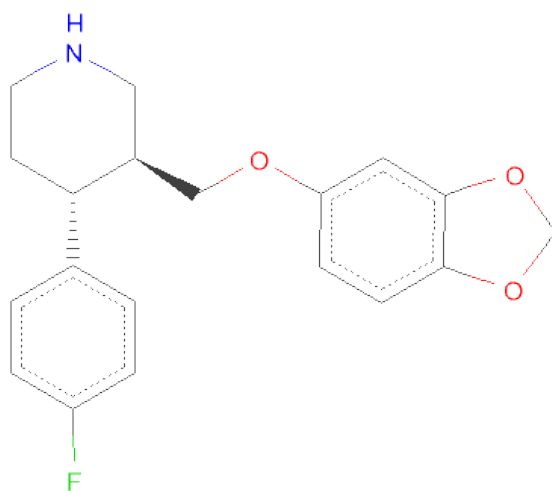
There are 5 unique types of molecules in this entry. The entry contains 8480 atoms, of which 0 are hydrogen and 0 are deuterium.

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 Rhodopsin kinase.

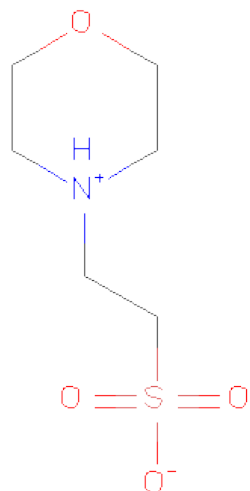
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	504	Total	C	N	O	S	0	0	0
			4040	2591	697	733	19			
1	B	493	Total	C	N	O	S	0	1	0
			3969	2547	686	717	19			

- Molecule 2 is PAROXETINE (three-letter code: 8PR) (formula: C<sub>19</sub>H<sub>20</sub>FNO<sub>3</sub>).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	F	N	O	0	0
			24	19	1	1	3		
2	B	1	Total	C	F	N	O	0	0
			24	19	1	1	3		

- Molecule 3 is 2-(N-MORPHOLINO)-ETHANESULFONICACID (three-letter code: MES) (formula: C<sub>6</sub>H<sub>13</sub>NO<sub>4</sub>S).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	S	0	0
			12	6	1	4	1		

- Molecule 4 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	B	2	Total	Cl	0	0
			2	2		

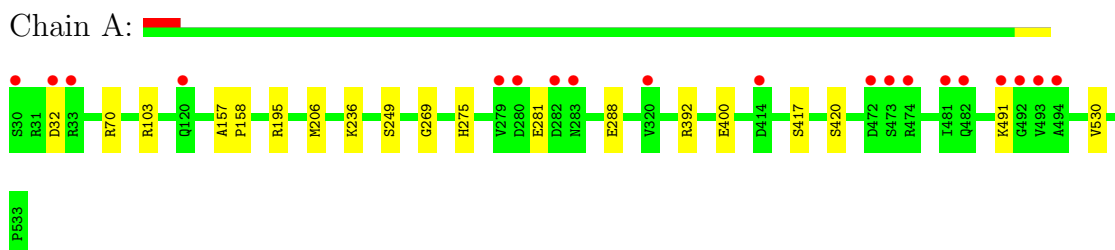
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	235	Total	O	0	0
			235	235		
5	B	174	Total	O	0	0
			174	174		

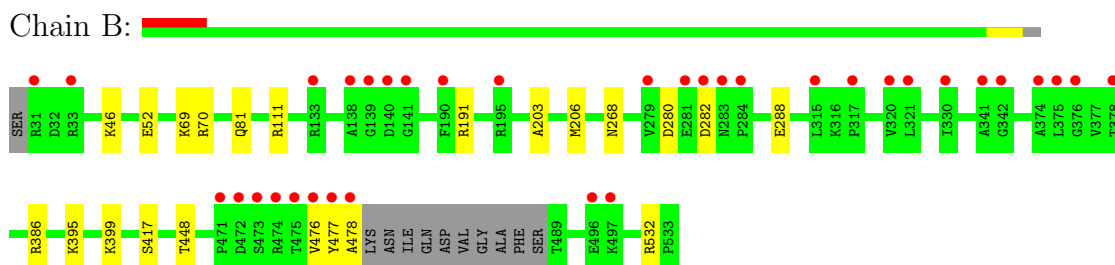
### 3 Residue-property plots

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.

- Molecule 1: Rhodopsin kinase



- Molecule 1: Rhodopsin kinase



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	66.79Å 122.09Å 152.89Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.93 – 2.32 29.93 – 2.32	Depositor EDS
% Data completeness (in resolution range)	99.9 (29.93-2.32) 100.0 (29.93-2.32)	Depositor EDS
$R_{merge}$	0.11	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.85 (at 2.31Å)	Xtriage
Refinement program	REFMAC 5.7.0032	Depositor
R, $R_{free}$	0.186 , 0.231 0.191 , 0.233	Depositor DCC
$R_{free}$ test set	2774 reflections (5.34%)	DCC
Wilson B-factor (Å <sup>2</sup> )	38.8	Xtriage
Anisotropy	0.033	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 31.5	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.33$	Xtriage
Outliers	0 of 54807 reflections	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	8480	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	46.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.63% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

## 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: 8PR, MES, CL

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	0.52	0/4136	0.69	1/5581 (0.0%)
1	B	0.51	0/4064	0.68	2/5483 (0.0%)
All	All	0.51	0/8200	0.68	3/11064 (0.0%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	111	ARG	NE-CZ-NH1	5.69	123.15	120.30
1	A	103	ARG	NE-CZ-NH2	-5.30	117.65	120.30
1	B	111	ARG	NE-CZ-NH2	-5.22	117.69	120.30

There are no chirality outliers.

There are no planarity outliers.

### 5.2 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 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	4040	0	0	7	0
1	B	3969	0	0	10	0
2	A	24	0	0	0	0
2	B	24	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	A	12	0	0	0	0
4	B	2	0	0	0	0
5	A	235	0	0	2	0
5	B	174	0	0	5	0
All	All	8480	0	0	17	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 2.

All (17) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:70:ARG:NH1	5:A:765:HOH:O	2.31	0.62
1:B:280:ASP:N	5:B:810:HOH:O	2.35	0.59
1:B:386:ARG:CZ	5:B:860:HOH:O	2.55	0.53
1:B:386:ARG:NE	5:B:860:HOH:O	2.45	0.49
1:A:392:ARG:NH1	5:A:861:HOH:O	2.48	0.47
1:B:476:VAL:O	1:B:478:ALA:N	2.48	0.47
1:B:288:GLU:OE2	1:B:417:SER:OG	2.33	0.46
1:A:288:GLU:CD	1:A:420:SER:OG	2.53	0.46
1:A:288:GLU:OE2	1:A:417:SER:OG	2.34	0.46
1:A:269:GLY:O	1:A:275:HIS:NE2	2.49	0.45
1:A:157:ALA:N	1:A:158:PRO:CD	2.81	0.43
1:B:46:LYS:NZ	5:B:758:HOH:O	2.51	0.43
1:B:191:ARG:O	1:B:203:ALA:N	2.50	0.43
1:B:81:GLN:OE1	1:B:81:GLN:N	2.53	0.42
1:A:32:ASP:OD1	1:A:32:ASP:C	2.59	0.41
1:B:532:ARG:CG	1:B:532:ARG:O	2.68	0.41
1:B:69:LYS:NZ	5:B:738:HOH:O	2.54	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	502/504 (100%)	484 (96%)	18 (4%)	0	100	100
1	B	490/504 (97%)	476 (97%)	13 (3%)	1 (0%)	56	67
All	All	992/1008 (98%)	960 (97%)	31 (3%)	1 (0%)	59	72

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	477	TYR

### 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	420/420 (100%)	412 (98%)	8 (2%)	69	85
1	B	412/420 (98%)	404 (98%)	8 (2%)	69	85
All	All	832/840 (99%)	816 (98%)	16 (2%)	69	85

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	195	ARG
1	A	206	MET
1	A	236	LYS
1	A	249	SER
1	A	281	GLU
1	A	400	GLU
1	A	491	LYS
1	A	530	VAL
1	B	52	GLU
1	B	70	ARG
1	B	206	MET
1	B	268	ASN
1	B	282	ASP
1	B	395	LYS
1	B	399	LYS
1	B	448	THR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 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 ⓘ

Of 5 ligands modelled in this entry, 2 are monoatomic - leaving 3 for Mogul analysis.

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	8PR	A	601	-	27,27,27	0.76	0	37,37,37	1.50	5 (13%)
3	MES	A	602	-	12,12,12	1.76	1 (8%)	16,16,16	1.29	1 (6%)
2	8PR	B	601	-	27,27,27	0.85	1 (3%)	37,37,37	1.51	5 (13%)

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	8PR	A	601	-	-	0/9/26/26	0/2/4/4
3	MES	A	602	-	-	0/6/14/14	0/1/1/1
2	8PR	B	601	-	-	0/9/26/26	0/2/4/4

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	602	MES	C8-S	-5.43	1.68	1.78
2	B	601	8PR	OAQ-CAV	-2.06	1.35	1.38

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	601	8PR	CAK-NAN-CAI	5.88	121.41	111.59
2	A	601	8PR	CAK-NAN-CAI	5.42	120.64	111.59
3	A	602	MES	O1-C2-C3	-4.10	106.46	111.34
2	A	601	8PR	CAC-CAR-CAB	-3.10	118.69	122.90
2	A	601	8PR	CAE-CAB-CAR	2.63	121.11	118.33
2	B	601	8PR	CAL-OAQ-CAV	2.62	109.13	105.36
2	B	601	8PR	CAC-CAR-CAB	-2.53	119.47	122.90
2	B	601	8PR	CAK-CAW-CAM	-2.19	107.90	111.22
2	B	601	8PR	OAP-CAL-OAQ	-2.16	104.34	108.09
2	A	601	8PR	CAM-OAO-CAS	2.13	122.42	117.91
2	A	601	8PR	CAL-OAQ-CAV	2.09	108.37	105.36

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 ⓘ

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	504/504 (100%)	0.05	19 (3%)	38 49	24, 41, 73, 106	0
1	B	493/504 (97%)	0.16	35 (7%)	16 23	26, 44, 77, 117	0
All	All	997/1008 (98%)	0.11	54 (5%)	25 35	24, 43, 76, 117	0

All (54) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	474	ARG	5.6
1	A	282	ASP	5.4
1	A	474	ARG	4.8
1	A	482	GLN	4.8
1	B	282	ASP	4.7
1	B	33	ARG	4.6
1	A	492	GLY	4.6
1	A	481	ILE	4.5
1	B	279	VAL	4.4
1	B	472	ASP	4.4
1	A	30	SER	4.0
1	A	472	ASP	4.0
1	B	473	SER	3.7
1	A	493	VAL	3.7
1	B	375	LEU	3.5
1	B	281	GLU	3.4
1	B	138	ALA	3.3
1	B	475	THR	3.3
1	A	279	VAL	3.3
1	B	341	ALA	3.2
1	B	139	GLY	3.2
1	B	477	TYR	3.1
1	B	497	LYS	3.1
1	B	140	ASP	3.1

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Mol	Chain	Res	Type	RSRZ
1	B	374	ALA	2.9
1	A	33	ARG	2.8
1	B	320	VAL	2.8
1	A	473	SER	2.8
1	A	283	ASN	2.8
1	A	320	VAL	2.7
1	B	315	LEU	2.7
1	B	476	VAL	2.6
1	B	317	PRO	2.6
1	B	478	ALA	2.6
1	B	376	GLY	2.6
1	A	280	ASP	2.5
1	B	31	ARG	2.5
1	B	195	ARG	2.5
1	B	321	LEU	2.5
1	B	378	THR	2.3
1	B	133	ARG	2.3
1	A	414	ASP	2.3
1	A	494	ALA	2.3
1	A	120	GLN	2.2
1	B	471	PRO	2.2
1	B	496	GLU	2.2
1	B	342	GLY	2.2
1	A	32	ASP	2.1
1	A	491	LYS	2.1
1	B	284	PRO	2.1
1	B	190	PHE	2.1
1	B	283	ASN	2.1
1	B	330	ILE	2.0
1	B	141	GLY	2.0

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

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

## 6.3 Carbohydrates ⓘ

There are no carbohydrates in this entry.

## 6.4 Ligands

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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95<sup>th</sup> 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	RSR	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
2	8PR	B	601	24/24	0.18	0.10	35,55,60,62	0
2	8PR	A	601	24/24	0.17	-0.00	44,52,56,57	0
3	MES	A	602	12/12	0.07	-1.76	31,35,38,38	0
4	CL	B	603	1/1	0.07	-2.64	31,31,31,31	0
4	CL	B	602	1/1	0.08	-2.78	49,49,49,49	0

## 6.5 Other polymers

There are no such residues in this entry.