wwPDB EM Validation Summary Report (i)

Jul 15, 2025 – 11:09 AM JST

PDB ID	:	9J1P / pdb_00009j1p
EMDB ID	:	EMD-61077
Title	:	Cryo-EM structure of the g1:Ox-bound human GLP-1R-Gs complex
Authors	:	Fan, S.; Li, J.; Zhuang, J.; Zhou, Q.; Mai, Y.; Lin, B.; Wang, M.-W.; Wu, C.
Deposited on	:	2024-08-05
Resolution	:	2.99 Å(reported)

This is a wwPDB EM 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/EMValidationReportHelp
with specific help available everywhere you see the (i) 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 (i)) were used in the production of this report:

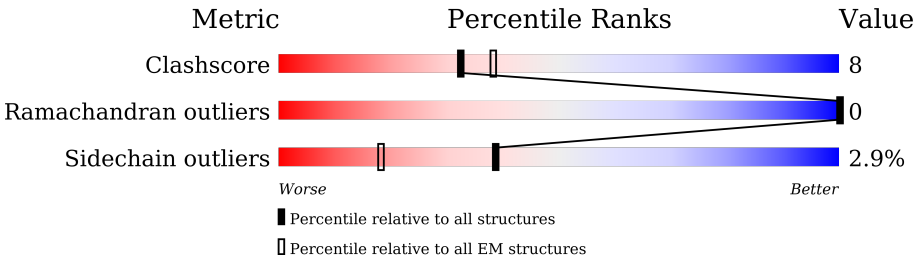
EMDB validation analysis	:	FAILED
MolProbity	:	4-5-2 with Phenix2.0rc1
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	FAILED
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.44

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 2.99 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)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the 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 <=5%

Mol	Chain	Length	Quality of chain
1	A	361	50% 16% 35%
2	B	345	74% 22% • •
3	G	70	54% 19% 27%
4	N	140	69% 19% • 11%
5	P	49	82% 16% •
6	R	440	74% 15% 12%

2 Entry composition (i)

There are 6 unique types of molecules in this entry. The entry contains 9385 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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 Guanine nucleotide-binding protein G(i) subunit alpha-1,Guanine nucleotide-binding protein G(s) subunit alpha isoforms short,Guanine nucleotide-binding protein G(s) subunit alpha isoforms XLas.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	235	1941	1226	349	358	8	0	0

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	49	ASP	GLY	conflict	UNP P63092
A	50	ASN	GLU	conflict	UNP P63092
A	63	TYR	LEU	conflict	UNP P63092
A	226	ALA	GLY	conflict	UNP P63092
A	249	ASP	ALA	conflict	UNP P63092
A	252	ASP	SER	conflict	UNP P63092
A	272	ASP	LEU	conflict	UNP Q5JWF2
A	366	SER	ALA	conflict	UNP Q5JWF2
A	372	ALA	ILE	conflict	UNP Q5JWF2
A	375	ILE	VAL	conflict	UNP Q5JWF2

- Molecule 2 is a protein called Guanine nucleotide-binding protein G(I)/G(S)/G(T) subunit beta-1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	338	2586	1597	463	505	21	0	0

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-4	MET	-	initiating methionine	UNP P54311
B	-3	GLY	-	expression tag	UNP P54311
B	-2	SER	-	expression tag	UNP P54311
B	-1	LEU	-	expression tag	UNP P54311

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Chain	Residue	Modelled	Actual	Comment	Reference
B	0	LEU	-	expression tag	UNP P54311
B	1	GLN	-	expression tag	UNP P54311

- Molecule 3 is a protein called Guanine nucleotide-binding protein G(I)/G(S)/G(O) subunit gamma-2.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	G	51	Total	C	N	O	S	0	0
			396	249	70	74	3		

- Molecule 4 is a protein called Nanobody-35.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	N	124	Total	C	N	O	S	0	0
			947	590	166	185	6		

- Molecule 5 is a protein called g1:Ox.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	P	49	Total	C	N	O	S	0	0
			353	220	56	71	6		

- Molecule 6 is a protein called Glucagon-like peptide 1 receptor.

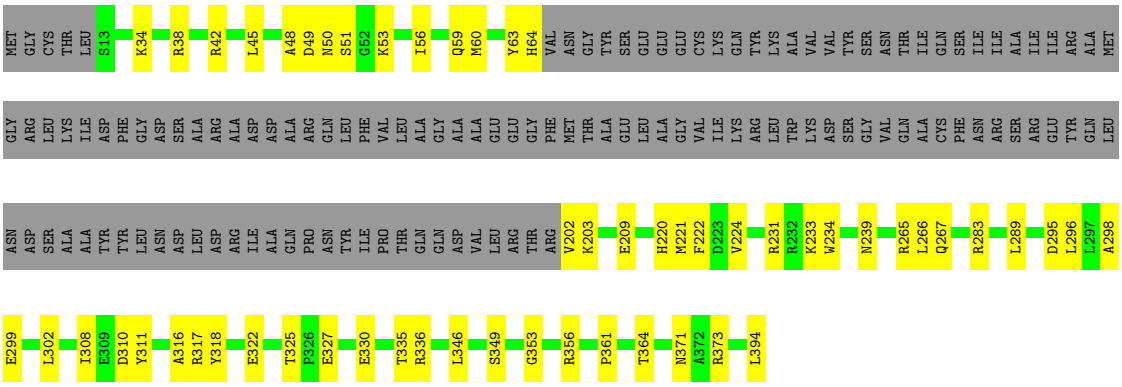
Mol	Chain	Residues	Atoms					AltConf	Trace
6	R	389	Total	C	N	O	S	0	0
			3162	2091	516	535	20		

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. 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. 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.

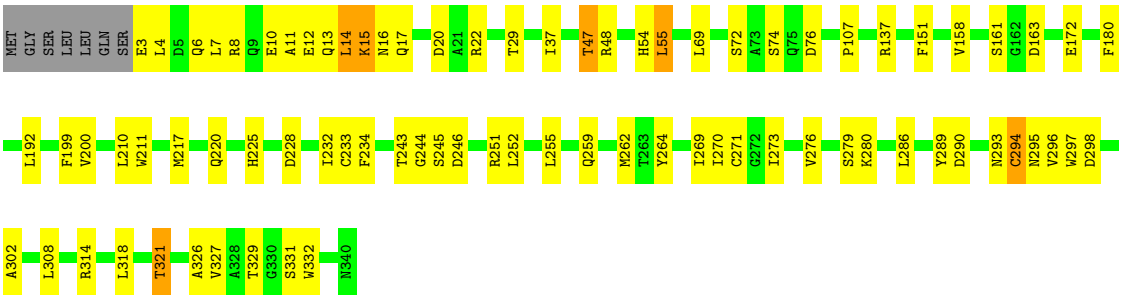
• Molecule 1: Guanine nucleotide-binding protein G(i) subunit alpha-1,Guanine nucleotide-binding protein G(s) subunit alpha isoforms short,Guanine nucleotide-binding protein G(s) subunit alpha isoforms XLas

Chain A:



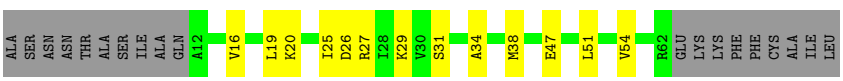
• Molecule 2: Guanine nucleotide-binding protein G(I)/G(S)/G(T) subunit beta-1

Chain B:



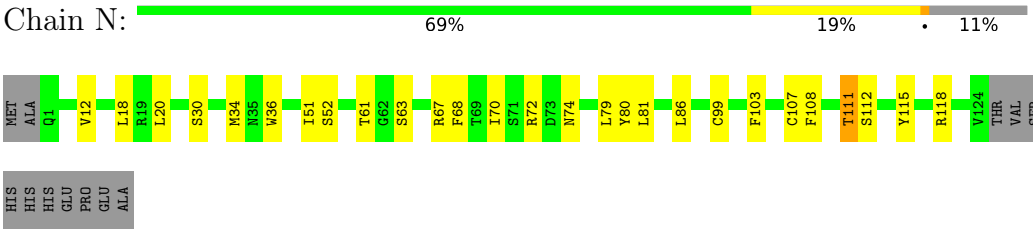
• Molecule 3: Guanine nucleotide-binding protein G(I)/G(S)/G(O) subunit gamma-2

Chain G:



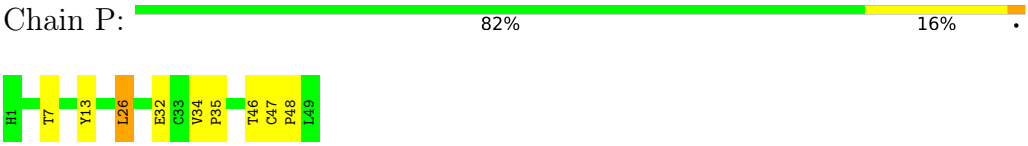
• Molecule 4: Nanobody-35

Chain N:



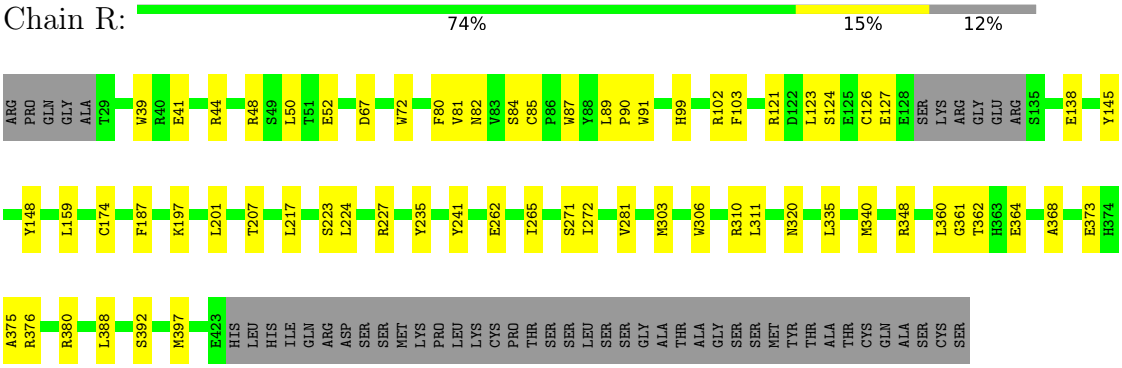
• Molecule 5: g1:Ox

Chain P:



• Molecule 6: Glucagon-like peptide 1 receptor

Chain R:



4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	453117	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	80	Depositor
Minimum defocus (nm)	1500	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor

5 Model quality

5.1 Standard geometry

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	0.12	0/1980	0.30	0/2668
2	B	0.16	0/2633	0.33	0/3572
3	G	0.12	0/402	0.32	0/542
4	N	0.07	0/967	0.23	0/1309
5	P	0.17	0/362	0.39	0/496
6	R	0.12	0/3258	0.28	0/4445
All	All	0.13	0/9602	0.30	0/13032

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

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	1941	0	1902	36	0
2	B	2586	0	2484	54	0
3	G	396	0	407	8	0
4	N	947	0	912	19	0
5	P	353	0	324	7	0
6	R	3162	0	3091	41	0
All	All	9385	0	9120	154	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 8.

The worst 5 of 154 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:353:GLY:HA2	1:A:356:ARG:HH21	1.38	0.86
1:A:283:ARG:HD2	1:A:356:ARG:HH12	1.54	0.71
3:G:47:GLU:N	3:G:47:GLU:OE2	2.23	0.70
1:A:45:LEU:HB2	1:A:221:MET:HE3	1.74	0.69
5:P:48:PRO:HG3	6:R:207:THR:HB	1.77	0.66

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 PDB entries followed by that with respect to all EM entries.

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	231/361 (64%)	218 (94%)	13 (6%)	0	100	100
2	B	336/345 (97%)	315 (94%)	21 (6%)	0	100	100
3	G	49/70 (70%)	46 (94%)	3 (6%)	0	100	100
4	N	122/140 (87%)	120 (98%)	2 (2%)	0	100	100
5	P	47/49 (96%)	41 (87%)	6 (13%)	0	100	100
6	R	385/440 (88%)	362 (94%)	23 (6%)	0	100	100
All	All	1170/1405 (83%)	1102 (94%)	68 (6%)	0	100	100

There are no Ramachandran outliers to report.

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 PDB entries followed by that with respect to all EM entries.

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	209/315 (66%)	202 (97%)	7 (3%)	33	67
2	B	278/287 (97%)	269 (97%)	9 (3%)	34	67
3	G	42/57 (74%)	40 (95%)	2 (5%)	21	55
4	N	102/116 (88%)	101 (99%)	1 (1%)	73	88
5	P	40/40 (100%)	38 (95%)	2 (5%)	20	53
6	R	333/392 (85%)	325 (98%)	8 (2%)	44	74
All	All	1004/1207 (83%)	975 (97%)	29 (3%)	39	70

5 of 29 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	296	VAL
6	R	340	MET
3	G	54	VAL
6	R	217	LEU
3	G	51	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 10 such sidechains are listed below:

Mol	Chain	Res	Type
6	R	177	ASN
6	R	320	ASN
6	R	338	ASN
2	B	36	ASN
2	B	155	ASN

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)

There are no ligands in this entry.

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.