



Full wwPDB EM Validation Report ⓘ

Oct 28, 2024 – 01:12 PM JST

PDB ID : 8WC7
EMDB ID : EMD-37433
Title : Cryo-EM structure of the ZH8667-bound mTAAR1-Gs complex
Authors : Rong, N.K.; Guo, L.L.; Zhang, M.H.; Li, Q.; Yang, F.; Sun, J.P.
Deposited on : 2023-09-11
Resolution : 3.10 Å(reported)

This is a Full wwPDB EM 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/EMValidationReportHelp>

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:

EMDB validation analysis : **FAILED**
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4.02b-467
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) : 2.39

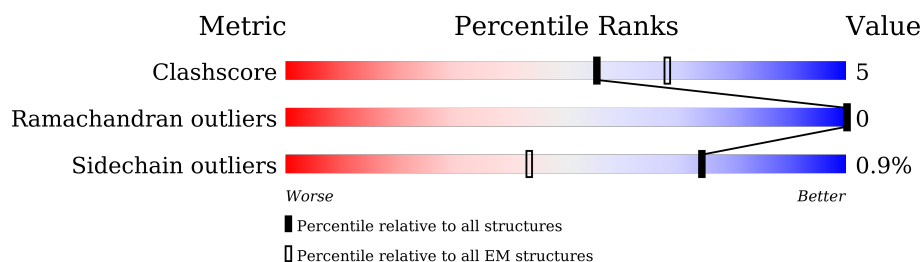
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.10 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 $\leq 5\%$.

Mol	Chain	Length	Quality of chain
1	A	362	
2	B	345	
3	R	332	
4	S	285	
5	Y	71	

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 8532 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(s) subunit alpha isoforms short.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	227	Total	C	N	O	S	0	0
			1856	1174	333	341	8		

- 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
2	B	336	Total	C	N	O	S	0	0
			2523	1560	450	492	21		

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-4	MET	-	initiating methionine	UNP P62873
B	-3	GLY	-	expression tag	UNP P62873
B	-2	SER	-	expression tag	UNP P62873
B	-1	LEU	-	expression tag	UNP P62873
B	0	LEU	-	expression tag	UNP P62873
B	1	GLN	-	expression tag	UNP P62873

- Molecule 3 is a protein called Trace amine-associated receptor 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	R	270	Total	C	N	O	S	0	0
			1984	1327	318	326	13		

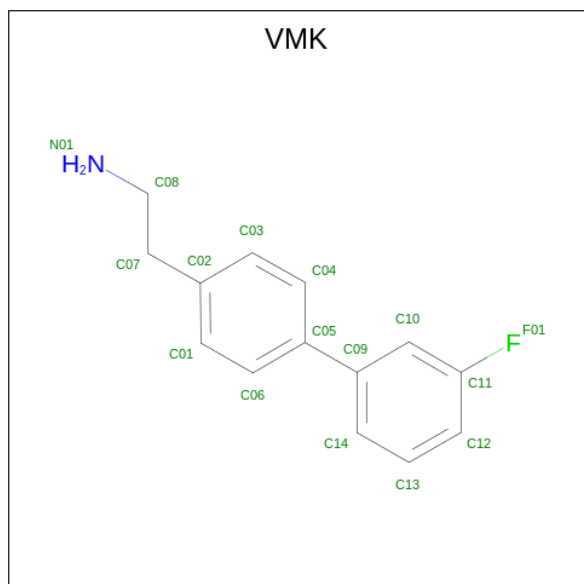
- Molecule 4 is a protein called scFv16.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	S	233	Total	C	N	O	S	0	0
			1769	1124	290	345	10		

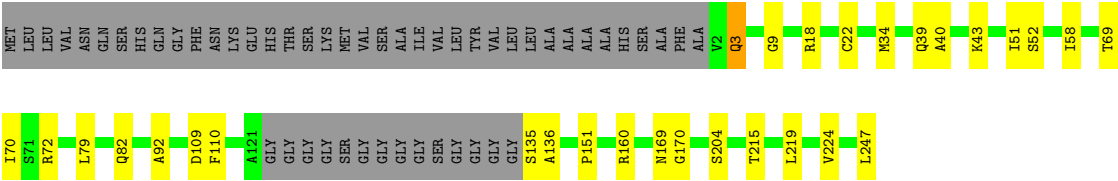
- Molecule 5 is a protein called Guanine nucleotide-binding protein G(I)/G(S)/G(O) subunit gamma-2.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	Y	56	Total	C	N	O	S	0	0
			384	241	67	73	3		

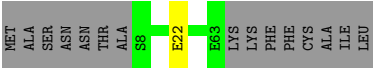
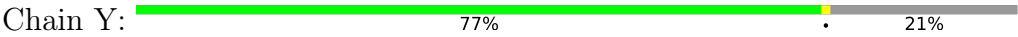
- Molecule 6 is 2-[4-(3-fluorophenyl)phenyl]ethanamine (three-letter code: VMK) (formula: C₁₄H₁₄FN).



Mol	Chain	Residues	Atoms				AltConf
6	R	1	Total	C	F	N	0
			16	14	1	1	



- Molecule 5: Guanine nucleotide-binding protein G(I)/G(S)/G(O) subunit gamma-2



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	448155	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	1.875	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor

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: VMK

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	0.25	0/1889	0.50	0/2541
2	B	0.25	0/2569	0.54	0/3491
3	R	0.36	0/2042	0.48	0/2799
4	S	0.25	0/1813	0.49	0/2461
5	Y	0.37	0/390	0.46	0/534
All	All	0.29	0/8703	0.50	0/11826

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	1856	0	1819	20	0
2	B	2523	0	2379	26	0
3	R	1984	0	1859	17	0
4	S	1769	0	1689	17	0
5	Y	384	0	347	1	0
6	R	16	0	0	3	0
All	All	8532	0	8093	79	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 5.

All (79) 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)
2:B:22:ARG:HG3	2:B:259:GLN:OE1	1.63	0.97
3:R:287:TYR:HD2	6:R:401:VMK:C07	1.79	0.95
3:R:287:TYR:CD2	6:R:401:VMK:C07	2.53	0.91
2:B:22:ARG:HH11	2:B:22:ARG:HG2	1.48	0.79
2:B:22:ARG:CG	2:B:259:GLN:OE1	2.36	0.74
2:B:230:ASN:ND2	2:B:246:ASP:OD1	2.24	0.71
2:B:22:ARG:HH11	2:B:22:ARG:CG	2.04	0.70
2:B:160:SER:HB2	2:B:190:LEU:HD23	1.74	0.69
2:B:22:ARG:HD2	2:B:258:ASP:O	1.92	0.69
4:S:69:THR:HB	4:S:82:GLN:HB3	1.77	0.66
5:Y:22:GLU:HG2	5:Y:22:GLU:O	1.97	0.63
3:R:96:LYS:HB3	3:R:159:PHE:HE1	1.64	0.63
4:S:9:GLY:O	4:S:18:ARG:NH1	2.31	0.62
4:S:224:VAL:HG22	4:S:247:LEU:HD23	1.81	0.62
4:S:40:ALA:HB3	4:S:43:LYS:HB2	1.84	0.59
3:R:183:PRO:HB3	3:R:185:PHE:HE1	1.69	0.57
1:A:348:ASP:OD1	1:A:352:ARG:NH1	2.34	0.57
1:A:309:ARG:HE	1:A:313:LEU:HD11	1.69	0.57
2:B:295:ASN:OD1	2:B:304:ARG:NH1	2.38	0.56
4:S:151:PRO:HA	4:S:219:LEU:HD22	1.87	0.56
3:R:102:ASP:OD2	6:R:401:VMK:N01	2.41	0.54
4:S:51:ILE:HB	4:S:70:ILE:HD12	1.90	0.53
2:B:271:CYS:HB2	2:B:290:ASP:HB2	1.91	0.51
1:A:268:VAL:HG21	1:A:301:VAL:HG22	1.92	0.50
4:S:58:ILE:HG23	4:S:70:ILE:HD11	1.94	0.50
1:A:223:PHE:HE2	1:A:243:ILE:HD12	1.78	0.49
1:A:332:CYS:SG	1:A:333:SER:N	2.85	0.49
2:B:266:HIS:HE1	2:B:268:ASN:OD1	1.95	0.49
3:R:183:PRO:HB3	3:R:185:PHE:CE1	2.48	0.49
1:A:228:SER:O	1:A:228:SER:OG	2.28	0.49
2:B:279:SER:OG	2:B:280:LYS:N	2.46	0.48
3:R:88:TRP:CZ2	3:R:90:PHE:HB2	2.49	0.48
2:B:38:ASP:OD1	2:B:38:ASP:N	2.46	0.48
1:A:188:LYS:HG2	1:A:197:HIS:CE1	2.48	0.48
4:S:204:SER:OG	4:S:215:THR:OG1	2.32	0.48
4:S:169:ASN:OD1	4:S:170:GLY:N	2.47	0.47
2:B:34:THR:HG21	2:B:300:LEU:HB3	1.96	0.47
4:S:34:MET:HG3	4:S:79:LEU:HD13	1.97	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:311:GLU:O	1:A:314:ARG:HG2	2.16	0.46
2:B:254:ASP:OD1	2:B:255:LEU:N	2.48	0.46
1:A:27:LYS:HA	2:B:55:LEU:HD21	1.98	0.45
2:B:229:ILE:HD12	2:B:243:THR:HG21	1.99	0.45
1:A:288:PRO:HG2	1:A:291:ALA:HB2	1.99	0.45
4:S:109:ASP:OD1	4:S:110:PHE:N	2.49	0.45
2:B:22:ARG:CD	2:B:258:ASP:O	2.64	0.45
3:R:56:PRO:HB3	3:R:139:ILE:HG13	1.98	0.44
3:R:274:LEU:HG	3:R:275:GLY:H	1.82	0.44
1:A:231:ASN:OD1	1:A:232:ARG:HG3	2.17	0.44
3:R:121:TYR:O	3:R:125:CYS:HB2	2.17	0.44
4:S:39:GLN:O	4:S:92:ALA:HB1	2.18	0.44
2:B:275:SER:HB2	2:B:318:LEU:HD13	2.00	0.44
2:B:234:PHE:CE2	2:B:238:GLY:HA2	2.53	0.44
4:S:52:SER:O	4:S:72:ARG:NH1	2.51	0.43
1:A:277:ASP:OD1	1:A:277:ASP:N	2.51	0.43
3:R:88:TRP:CZ3	3:R:95:CYS:HB2	2.53	0.43
4:S:3:GLN:HE21	4:S:3:GLN:HB2	1.70	0.43
2:B:266:HIS:CE1	2:B:268:ASN:OD1	2.71	0.43
1:A:313:LEU:HD21	1:A:328:PRO:HG3	1.99	0.43
2:B:220:GLN:NE2	2:B:258:ASP:OD2	2.38	0.43
4:S:22:CYS:HB3	4:S:79:LEU:HB3	2.00	0.43
1:A:231:ASN:OD1	1:A:232:ARG:N	2.52	0.42
1:A:210:LYS:HD3	1:A:210:LYS:HA	1.79	0.42
3:R:70:LEU:HB3	3:R:105:LEU:HD21	2.02	0.42
3:R:112:HIS:O	3:R:116:ILE:HG13	2.20	0.42
1:A:309:ARG:HE	1:A:313:LEU:CD1	2.31	0.42
4:S:135:SER:OG	4:S:136:ALA:N	2.52	0.42
3:R:208:VAL:O	3:R:212:ILE:HG13	2.19	0.42
2:B:233:CYS:O	2:B:241:PHE:HB2	2.20	0.41
2:B:186:ASP:N	2:B:186:ASP:OD1	2.50	0.41
3:R:96:LYS:O	3:R:99:THR:HG22	2.21	0.41
1:A:229:ASP:HB3	1:A:231:ASN:OD1	2.20	0.41
3:R:119:ASP:OD1	3:R:120:ARG:N	2.53	0.41
2:B:51:LEU:HB2	2:B:336:LEU:HB2	2.03	0.41
1:A:332:CYS:O	1:A:333:SER:C	2.59	0.41
3:R:172:ARG:O	3:R:177:ASP:N	2.53	0.41
1:A:27:LYS:HB2	2:B:55:LEU:HD11	2.03	0.41
2:B:22:ARG:CB	2:B:22:ARG:NH1	2.84	0.41
1:A:269:LEU:HB2	1:A:300:ARG:HH21	1.85	0.40
4:S:160:ARG:HE	4:S:160:ARG:HB3	1.71	0.40

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	217/362 (60%)	212 (98%)	5 (2%)	0	100	100
2	B	332/345 (96%)	320 (96%)	12 (4%)	0	100	100
3	R	266/332 (80%)	249 (94%)	17 (6%)	0	100	100
4	S	229/285 (80%)	217 (95%)	12 (5%)	0	100	100
5	Y	54/71 (76%)	51 (94%)	3 (6%)	0	100	100
All	All	1098/1395 (79%)	1049 (96%)	49 (4%)	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	199/316 (63%)	196 (98%)	3 (2%)	60	80
2	B	264/287 (92%)	262 (99%)	2 (1%)	79	89
3	R	185/295 (63%)	183 (99%)	2 (1%)	70	84
4	S	192/228 (84%)	191 (100%)	1 (0%)	86	92
5	Y	33/58 (57%)	33 (100%)	0	100	100
All	All	873/1184 (74%)	865 (99%)	8 (1%)	74	88

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	197	HIS
1	A	321	ASP
1	A	333	SER
2	B	22	ARG
2	B	44	GLN
3	R	96	LYS
3	R	153	TYR
4	S	3	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
2	B	266	HIS

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](#)

1 ligand is 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
6	VMK	R	401	-	16,17,17	0.55	0	21,22,22	1.02	1 (4%)

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
6	VMK	R	401	-	-	7/7/7/7	0/2/2/2

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	R	401	VMK	C12-C11-C10	-2.54	119.99	123.29

There are no chirality outliers.

All (7) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	R	401	VMK	C02-C07-C08-N01
6	R	401	VMK	C04-C05-C09-C10
6	R	401	VMK	C06-C05-C09-C14
6	R	401	VMK	C04-C05-C09-C14
6	R	401	VMK	C06-C05-C09-C10
6	R	401	VMK	C03-C02-C07-C08
6	R	401	VMK	C01-C02-C07-C08

There are no ring outliers.

1 monomer is involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	R	401	VMK	3	0

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.