



Full wwPDB EM Validation Report ⓘ

Mar 3, 2025 – 12:22 pm GMT

PDB ID : 8R1Z
EMDB ID : EMD-18829
Title : MUC5AC D3 assembly. SNPs rs36189285, rs878913005: Arg996Gln, Arg1201Trp.
Authors : Trillo-Muyo, S.; Hansson, G.C.
Deposited on : 2023-11-02
Resolution : 3.20 Å(reported)
Based on initial model : 8QTV

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**
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) : 2.41

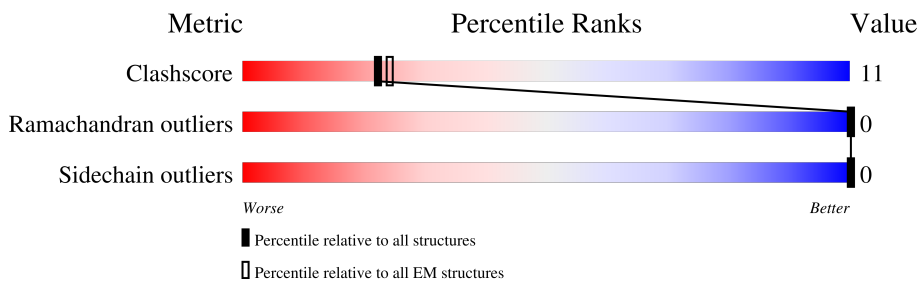
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.20 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	511	
1	B	511	

2 Entry composition i

There are 2 unique types of molecules in this entry. The entry contains 5028 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 Mucin-5AC.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	329	2513	1576	421	484	32	0	0
1	B	329	2513	1576	421	484	32	0	0

There are 94 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	879	ASP	-	expression tag	UNP P98088
A	880	ALA	-	expression tag	UNP P98088
A	881	ALA	-	expression tag	UNP P98088
A	882	GLN	-	expression tag	UNP P98088
A	883	PRO	-	expression tag	UNP P98088
A	884	ALA	-	expression tag	UNP P98088
A	885	ARG	-	expression tag	UNP P98088
A	886	ARG	-	expression tag	UNP P98088
A	887	ALA	-	expression tag	UNP P98088
A	888	VAL	-	expression tag	UNP P98088
A	889	ARG	-	expression tag	UNP P98088
A	890	SER	-	expression tag	UNP P98088
A	891	SER	-	expression tag	UNP P98088
A	892	ARG	-	expression tag	UNP P98088
A	893	HIS	-	expression tag	UNP P98088
A	894	HIS	-	expression tag	UNP P98088
A	895	HIS	-	expression tag	UNP P98088
A	896	HIS	-	expression tag	UNP P98088
A	897	HIS	-	expression tag	UNP P98088
A	898	HIS	-	expression tag	UNP P98088
A	899	GLY	-	expression tag	UNP P98088
A	900	SER	-	expression tag	UNP P98088
A	996	GLN	ARG	engineered mutation	UNP P98088
A	1201	TRP	ARG	engineered mutation	UNP P98088
A	1367	ASP	SER	conflict	UNP P98088
A	1368	ASP	-	expression tag	UNP P98088

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Chain	Residue	Modelled	Actual	Comment	Reference
A	1369	ASP	-	expression tag	UNP P98088
A	1370	ASP	-	expression tag	UNP P98088
A	1371	LYS	-	expression tag	UNP P98088
A	1372	THR	-	expression tag	UNP P98088
A	1373	SER	-	expression tag	UNP P98088
A	1374	GLU	-	expression tag	UNP P98088
A	1375	GLN	-	expression tag	UNP P98088
A	1376	LYS	-	expression tag	UNP P98088
A	1377	LEU	-	expression tag	UNP P98088
A	1378	ILE	-	expression tag	UNP P98088
A	1379	SER	-	expression tag	UNP P98088
A	1380	GLU	-	expression tag	UNP P98088
A	1381	GLU	-	expression tag	UNP P98088
A	1382	ASP	-	expression tag	UNP P98088
A	1383	LEU	-	expression tag	UNP P98088
A	1384	SER	-	expression tag	UNP P98088
A	1385	ARG	-	expression tag	UNP P98088
A	1386	LYS	-	expression tag	UNP P98088
A	1387	LEU	-	expression tag	UNP P98088
A	1388	THR	-	expression tag	UNP P98088
A	1389	ARG	-	expression tag	UNP P98088
B	879	ASP	-	expression tag	UNP P98088
B	880	ALA	-	expression tag	UNP P98088
B	881	ALA	-	expression tag	UNP P98088
B	882	GLN	-	expression tag	UNP P98088
B	883	PRO	-	expression tag	UNP P98088
B	884	ALA	-	expression tag	UNP P98088
B	885	ARG	-	expression tag	UNP P98088
B	886	ARG	-	expression tag	UNP P98088
B	887	ALA	-	expression tag	UNP P98088
B	888	VAL	-	expression tag	UNP P98088
B	889	ARG	-	expression tag	UNP P98088
B	890	SER	-	expression tag	UNP P98088
B	891	SER	-	expression tag	UNP P98088
B	892	ARG	-	expression tag	UNP P98088
B	893	HIS	-	expression tag	UNP P98088
B	894	HIS	-	expression tag	UNP P98088
B	895	HIS	-	expression tag	UNP P98088
B	896	HIS	-	expression tag	UNP P98088
B	897	HIS	-	expression tag	UNP P98088
B	898	HIS	-	expression tag	UNP P98088
B	899	GLY	-	expression tag	UNP P98088

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Chain	Residue	Modelled	Actual	Comment	Reference
B	900	SER	-	expression tag	UNP P98088
B	996	GLN	ARG	engineered mutation	UNP P98088
B	1201	TRP	ARG	engineered mutation	UNP P98088
B	1367	ASP	SER	conflict	UNP P98088
B	1368	ASP	-	expression tag	UNP P98088
B	1369	ASP	-	expression tag	UNP P98088
B	1370	ASP	-	expression tag	UNP P98088
B	1371	LYS	-	expression tag	UNP P98088
B	1372	THR	-	expression tag	UNP P98088
B	1373	SER	-	expression tag	UNP P98088
B	1374	GLU	-	expression tag	UNP P98088
B	1375	GLN	-	expression tag	UNP P98088
B	1376	LYS	-	expression tag	UNP P98088
B	1377	LEU	-	expression tag	UNP P98088
B	1378	ILE	-	expression tag	UNP P98088
B	1379	SER	-	expression tag	UNP P98088
B	1380	GLU	-	expression tag	UNP P98088
B	1381	GLU	-	expression tag	UNP P98088
B	1382	ASP	-	expression tag	UNP P98088
B	1383	LEU	-	expression tag	UNP P98088
B	1384	SER	-	expression tag	UNP P98088
B	1385	ARG	-	expression tag	UNP P98088
B	1386	LYS	-	expression tag	UNP P98088
B	1387	LEU	-	expression tag	UNP P98088
B	1388	THR	-	expression tag	UNP P98088
B	1389	ARG	-	expression tag	UNP P98088

- Molecule 2 is CALCIUM ION (three-letter code: CA) (formula: Ca) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms	AltConf
2	A	1	Total Ca 1 1	0
2	B	1	Total Ca 1 1	0

ASP
ASP
ASP
LYS
THR
SER
GLU
GLN
LYS
LEU
ILE
SER
GLU
GLU
ASP
LEU
SER
SER
ARG
LYS
LEU
THR
ARG

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	330230	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 ($e^-/\text{\AA}^2$)	1.26	Depositor
Minimum defocus (nm)	750	Depositor
Maximum defocus (nm)	2500	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: CA

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	0.26	0/2581	0.46	0/3516
1	B	0.26	0/2581	0.46	0/3516
All	All	0.26	0/5162	0.46	0/7032

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	2513	0	2337	57	0
1	B	2513	0	2337	56	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
All	All	5028	0	4674	109	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 11.

All (109) 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:B:1047:PHE:HB2	1:B:1054:VAL:HG13	1.67	0.76
1:A:1047:PHE:HB2	1:A:1054:VAL:HG13	1.67	0.76
1:B:1187:ARG:HD2	1:B:1215:PRO:HB2	1.72	0.71
1:A:1187:ARG:HD2	1:A:1215:PRO:HB2	1.72	0.70
1:A:1188:THR:HG23	1:A:1191:ASN:H	1.58	0.68
1:A:1028:PHE:HA	1:A:1031:ARG:HH22	1.60	0.67
1:B:1028:PHE:HA	1:B:1031:ARG:HH22	1.60	0.66
1:B:1188:THR:HG23	1:B:1191:ASN:H	1.58	0.65
1:B:1191:ASN:ND2	1:B:1195:ASP:O	2.30	0.65
1:A:1191:ASN:ND2	1:A:1195:ASP:O	2.30	0.64
1:A:1179:GLN:HG3	1:A:1182:GLY:H	1.63	0.63
1:B:1179:GLN:HG3	1:B:1182:GLY:H	1.64	0.63
1:A:1220:ASP:OD2	1:A:1221:LYS:NZ	2.31	0.63
1:A:1055:VAL:HG12	1:A:1057:ASP:H	1.64	0.63
1:B:1055:VAL:HG12	1:B:1057:ASP:H	1.64	0.62
1:B:1038:ASN:ND2	1:B:1040:ASP:OD2	2.32	0.62
1:A:1038:ASN:ND2	1:A:1040:ASP:OD2	2.32	0.62
1:B:1057:ASP:HB3	1:B:1060:GLU:HB2	1.83	0.60
1:A:1057:ASP:HB3	1:A:1060:GLU:HB2	1.83	0.60
1:A:929:LEU:HD13	1:A:1035:LEU:HB2	1.84	0.60
1:A:956:THR:HG21	1:A:1125:ALA:HB1	1.82	0.60
1:B:956:THR:HG21	1:B:1125:ALA:HB1	1.82	0.60
1:A:964:ILE:HB	1:A:975:LEU:HD12	1.84	0.59
1:A:1068:SER:HB3	1:A:1071:CYS:HB2	1.85	0.58
1:B:964:ILE:HB	1:B:975:LEU:HD12	1.84	0.58
1:B:929:LEU:HD13	1:B:1035:LEU:HB2	1.84	0.58
1:B:1220:ASP:OD2	1:B:1221:LYS:NZ	2.31	0.58
1:B:1157:THR:HB	1:B:1160:ILE:HG12	1.86	0.58
1:A:904:ALA:HB3	1:A:912:LEU:HB3	1.86	0.57
1:A:931:GLN:OE1	1:A:1050:ARG:NH2	2.38	0.57
1:A:1157:THR:HB	1:A:1160:ILE:HG12	1.86	0.57
1:B:1068:SER:HB3	1:B:1071:CYS:HB2	1.85	0.57
1:B:931:GLN:OE1	1:B:1050:ARG:NH2	2.38	0.57
1:B:904:ALA:HB3	1:B:912:LEU:HB3	1.86	0.56
1:A:1040:ASP:OD2	1:A:1045:ASN:ND2	2.39	0.56
1:B:1040:ASP:OD2	1:B:1045:ASN:ND2	2.39	0.55
1:A:932:ASN:HB3	1:A:943:SER:HA	1.92	0.52
1:B:932:ASN:HB3	1:B:943:SER:HA	1.92	0.52
1:B:905:VAL:HG22	1:B:911:TYR:HD2	1.75	0.52
1:B:1188:THR:HA	1:B:1216:ILE:HG23	1.91	0.52
1:A:1188:THR:HA	1:A:1216:ILE:HG23	1.91	0.52
1:A:905:VAL:HG22	1:A:911:TYR:HD2	1.75	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1167:TYR:CG	1:B:1158:PRO:HD3	2.45	0.51
1:A:1128:SER:HA	1:B:1086:PHE:HE2	1.75	0.51
1:B:1147:HIS:NE2	1:B:1181:CYS:O	2.33	0.50
1:B:1079:ASP:OD2	1:B:1082:THR:OG1	2.30	0.50
1:A:1013:LEU:HD13	1:A:1021:PHE:HB2	1.93	0.49
1:B:1013:LEU:HD13	1:B:1021:PHE:HB2	1.93	0.49
1:B:1218:ASP:OD1	1:B:1219:GLU:N	2.46	0.49
1:A:1002:LEU:HB3	1:A:1014:TRP:HB3	1.95	0.49
1:B:1002:LEU:HB3	1:B:1014:TRP:HB3	1.95	0.49
1:A:1147:HIS:NE2	1:A:1181:CYS:O	2.33	0.48
1:A:1218:ASP:OD1	1:A:1219:GLU:N	2.46	0.48
1:B:914:PHE:HE1	1:B:1023:ASN:HA	1.80	0.47
1:A:1049:THR:HG22	1:A:1061:PHE:HD1	1.79	0.47
1:B:1049:THR:HG22	1:B:1061:PHE:HD1	1.79	0.47
1:A:914:PHE:HE1	1:A:1023:ASN:HA	1.80	0.46
1:B:1131:ASP:N	1:B:1131:ASP:OD1	2.49	0.46
1:A:1080:PRO:HB3	1:A:1125:ALA:HB2	1.98	0.46
1:B:997:GLN:NE2	1:B:1001:TYR:O	2.43	0.46
1:A:1131:ASP:N	1:A:1131:ASP:OD1	2.49	0.45
1:B:1025:SER:HB3	1:B:1028:PHE:HE2	1.82	0.45
1:A:1079:ASP:OD2	1:A:1082:THR:OG1	2.30	0.45
1:A:997:GLN:NE2	1:A:1001:TYR:O	2.43	0.45
1:A:1025:SER:HB3	1:A:1028:PHE:CE2	2.52	0.45
1:A:1210:CYS:HB3	1:A:1215:PRO:HA	2.00	0.44
1:B:1025:SER:HB3	1:B:1028:PHE:CE2	2.52	0.44
1:B:1080:PRO:HB3	1:B:1125:ALA:HB2	1.98	0.44
1:B:905:VAL:HB	1:B:1020:ILE:HG23	2.00	0.44
1:B:1051:SER:OG	1:B:1053:SER:OG	2.34	0.44
1:A:1025:SER:HB3	1:A:1028:PHE:HE2	1.82	0.44
1:A:905:VAL:HB	1:A:1020:ILE:HG23	2.00	0.44
1:B:1210:CYS:HB3	1:B:1215:PRO:HA	1.99	0.43
1:A:1045:ASN:HA	1:A:1054:VAL:HG21	2.01	0.43
1:B:1187:ARG:NH2	1:B:1193:ARG:HD3	2.34	0.43
1:A:1164:PHE:HB2	1:B:1162:PRO:HB2	2.02	0.42
1:B:1028:PHE:HA	1:B:1031:ARG:NH2	2.31	0.42
1:A:1051:SER:OG	1:A:1053:SER:OG	2.34	0.42
1:B:1045:ASN:HA	1:B:1054:VAL:HG21	2.01	0.42
1:A:1192:PRO:HD2	1:A:1195:ASP:HB3	2.02	0.42
1:A:1199:ASP:OD1	1:A:1199:ASP:N	2.52	0.42
1:A:938:ASP:HB3	1:A:941:GLN:HA	2.01	0.42
1:A:951:VAL:HG11	1:A:962:LYS:HD3	2.02	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:1192:PRO:HD2	1:B:1195:ASP:HB3	2.02	0.42
1:A:1015:ASP:OD1	1:A:1019:SER:N	2.53	0.42
1:B:938:ASP:HB3	1:B:941:GLN:HA	2.01	0.42
1:B:1050:ARG:HG2	1:B:1065:TRP:CZ2	2.55	0.42
1:B:1015:ASP:OD1	1:B:1019:SER:N	2.53	0.41
1:A:1187:ARG:NH2	1:A:1193:ARG:HD3	2.34	0.41
1:A:933:HIS:ND1	1:A:938:ASP:HA	2.35	0.41
1:B:933:HIS:ND1	1:B:938:ASP:HA	2.35	0.41
1:A:1024:LEU:HD23	1:A:1039:PHE:CD2	2.56	0.41
1:B:965:LYS:HA	1:B:973:LEU:O	2.21	0.41
1:B:1084:ASN:HB3	1:B:1087:ARG:HD3	2.02	0.41
1:A:965:LYS:HA	1:A:973:LEU:O	2.21	0.41
1:A:1050:ARG:HG2	1:A:1065:TRP:CZ2	2.55	0.41
1:B:1024:LEU:HD23	1:B:1039:PHE:CD2	2.56	0.41
1:A:932:ASN:ND2	1:A:943:SER:H	2.19	0.41
1:A:946:VAL:HG12	1:A:966:ILE:HG23	2.02	0.41
1:A:1084:ASN:HB3	1:A:1087:ARG:HD3	2.02	0.41
1:A:1167:TYR:CD1	1:B:1158:PRO:HD3	2.56	0.41
1:B:951:VAL:HG11	1:B:962:LYS:HD3	2.02	0.41
1:B:932:ASN:HD22	1:B:943:SER:H	1.68	0.40
1:A:1182:GLY:HA3	1:A:1202:GLY:CA	2.51	0.40
1:B:946:VAL:HG12	1:B:966:ILE:HG23	2.02	0.40
1:A:1076:ALA:HA	1:A:1077:PRO:HD3	1.97	0.40
1:A:1024:LEU:HD21	1:A:1028:PHE:HB2	2.03	0.40
1:B:932:ASN:ND2	1:B:943:SER:H	2.19	0.40
1:B:1114:ARG:O	1:B:1117:GLU:HG3	2.22	0.40

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 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	327/511 (64%)	310 (95%)	17 (5%)	0	100	100
1	B	327/511 (64%)	310 (95%)	17 (5%)	0	100	100
All	All	654/1022 (64%)	620 (95%)	34 (5%)	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	278/434 (64%)	278 (100%)	0	100	100
1	B	278/434 (64%)	278 (100%)	0	100	100
All	All	556/868 (64%)	556 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

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

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](#)

Of 2 ligands modelled in this entry, 2 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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.