



wwPDB EM Validation Summary Report ⓘ

May 10, 2026 – 12:08 AM JST

PDB ID : 9UV4 / pdb_00009uv4
EMDB ID : EMD-64523
Title : Structure of MHV68 glycoprotein B in complex with Fab5
Authors : Cheng, B.Z.; Fang, X.Y.; Xie, C.; Sun, C.; Liu, Z.; Zeng, M.S.
Deposited on : 2025-05-09
Resolution : 3.30 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 ⓘ 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 : 4-5-2 with Phenix2.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : **NOT EXECUTED**
MapQ : **FAILED**
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

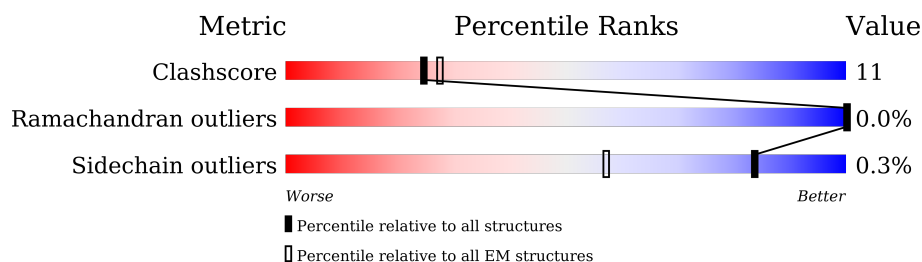
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.30 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	229148	23984
Ramachandran outliers	224038	23583
Sidechain outliers	223484	23102

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	I	224	49% 47%
1	J	224	49% 47%
1	K	224	49% 47%
2	M	213	48% 50%
2	N	213	48% 50%
2	O	213	48% 50%
3	A	658	70% 12% 19%
3	B	658	68% 13% 19%
3	C	658	70% 12% 19%

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 15814 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 Fab 5 H chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	I	118	Total	C	N	O	S	0	0
			836	529	144	161	2		
1	J	118	Total	C	N	O	S	0	0
			836	529	144	161	2		
1	K	118	Total	C	N	O	S	0	0
			836	529	144	161	2		

- Molecule 2 is a protein called Fab5 L chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	M	106	Total	C	N	O	S	0	0
			718	449	122	142	5		
2	N	106	Total	C	N	O	S	0	0
			718	449	122	142	5		
2	O	106	Total	C	N	O	S	0	0
			718	449	122	142	5		

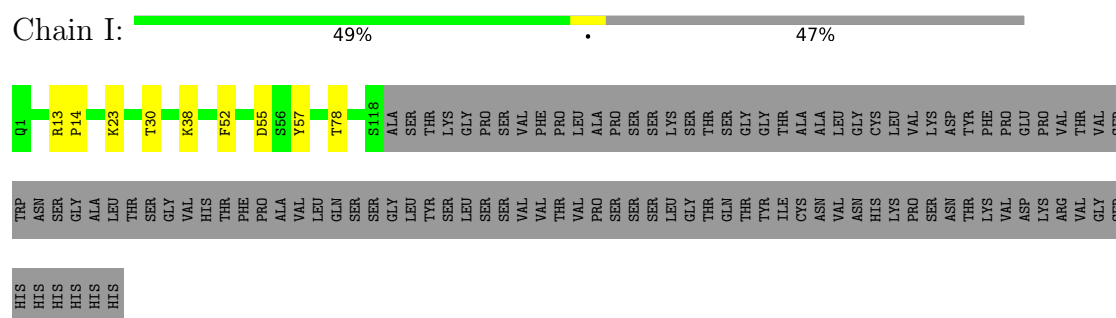
- Molecule 3 is a protein called MHV 68 glycoprotein B.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	A	536	Total	C	N	O	S	0	0
			3721	2350	656	704	11		
3	B	536	Total	C	N	O	S	0	0
			3714	2347	656	700	11		
3	C	536	Total	C	N	O	S	0	0
			3717	2348	656	702	11		

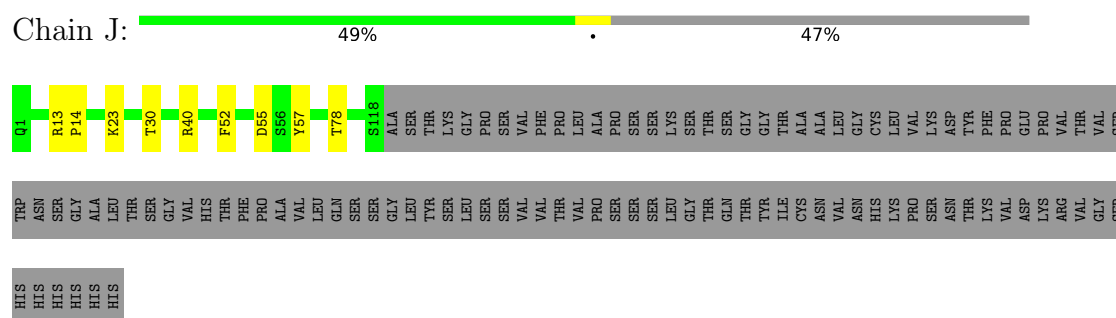
3 Residue-property plots [i](#)

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.

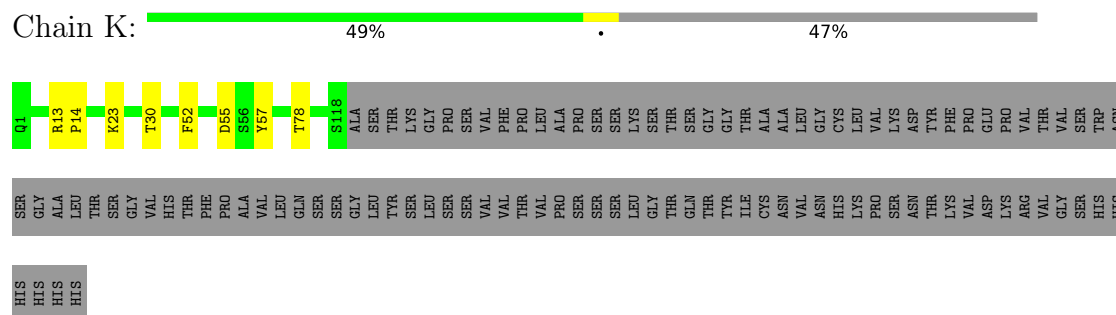
- Molecule 1: Fab 5 H chain



- Molecule 1: Fab 5 H chain



- Molecule 1: Fab 5 H chain



- Molecule 2: Fab5 L chain



- Molecule 2: Fab5 L chain



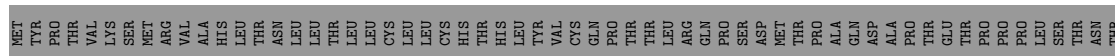
- Molecule 2: Fab5 L chain



- Molecule 3: MHV 68 glycoprotein B



- Molecule 3: MHV 68 glycoprotein B



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	116763	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 ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor

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	I	0.06	0/860	0.19	0/1179
1	J	0.07	0/860	0.19	0/1179
1	K	0.06	0/860	0.19	0/1179
2	M	0.08	0/736	0.25	0/1004
2	N	0.08	0/736	0.25	0/1004
2	O	0.08	0/736	0.25	0/1004
3	A	0.18	0/3799	0.36	0/5195
3	B	0.20	0/3792	0.37	1/5186 (0.0%)
3	C	0.20	0/3796	0.37	0/5192
All	All	0.17	0/16175	0.33	1/22122 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
3	B	518	GLY	N-CA-C	-6.17	107.58	115.42

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	I	836	0	692	6	0
1	J	836	0	692	6	0
1	K	836	0	692	5	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	M	718	0	581	3	0
2	N	718	0	581	3	0
2	O	718	0	581	3	0
3	A	3721	0	3015	150	0
3	B	3714	0	3002	133	0
3	C	3717	0	3010	129	0
All	All	15814	0	12846	303	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.

The worst 5 of 303 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)
3:B:481:TRP:CZ3	3:C:481:TRP:HZ3	0.99	1.65
3:A:481:TRP:CZ3	3:B:481:TRP:HZ3	1.09	1.65
3:A:481:TRP:HZ3	3:C:481:TRP:CZ3	1.13	1.63
3:B:481:TRP:CZ3	3:C:481:TRP:CZ3	1.79	1.60
3:B:492:TRP:CD1	3:C:491:MET:HE1	1.27	1.60

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	I	116/224 (52%)	115 (99%)	1 (1%)	0	100	100
1	J	116/224 (52%)	115 (99%)	1 (1%)	0	100	100
1	K	116/224 (52%)	115 (99%)	1 (1%)	0	100	100
2	M	104/213 (49%)	101 (97%)	3 (3%)	0	100	100
2	N	104/213 (49%)	101 (97%)	3 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	O	104/213 (49%)	101 (97%)	3 (3%)	0	100	100
3	A	528/658 (80%)	491 (93%)	37 (7%)	0	100	100
3	B	528/658 (80%)	478 (90%)	49 (9%)	1 (0%)	43	71
3	C	528/658 (80%)	485 (92%)	43 (8%)	0	100	100
All	All	2244/3285 (68%)	2102 (94%)	141 (6%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	B	517	VAL

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 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	I	71/193 (37%)	71 (100%)	0	100	100
1	J	71/193 (37%)	71 (100%)	0	100	100
1	K	71/193 (37%)	71 (100%)	0	100	100
2	M	59/186 (32%)	59 (100%)	0	100	100
2	N	59/186 (32%)	59 (100%)	0	100	100
2	O	59/186 (32%)	59 (100%)	0	100	100
3	A	290/595 (49%)	290 (100%)	0	100	100
3	B	286/595 (48%)	285 (100%)	1 (0%)	86	86
3	C	289/595 (49%)	286 (99%)	3 (1%)	68	76
All	All	1255/2922 (43%)	1251 (100%)	4 (0%)	84	86

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	B	516	TYR
3	C	100	LEU

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Mol	Chain	Res	Type
3	C	102	VAL
3	C	103	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 22 such sidechains are listed below:

Mol	Chain	Res	Type
3	B	499	ASN
3	C	398	ASN
3	C	321	HIS
3	C	404	GLN
3	A	408	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](#)

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.