



Full wwPDB EM Validation Report ⓘ

Jul 8, 2025 – 02:30 PM JST

PDB ID : 8HBI / pdb_00008hbi
EMDB ID : EMD-34636
Title : FMDV (A/TUR/14/98) in complex with M688F
Authors : Li, H.Z.; Dong, H.; Liu, P.
Deposited on : 2022-10-28
Resolution : 2.90 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**
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

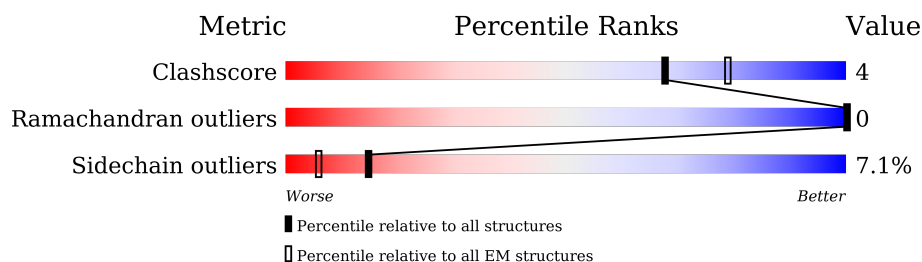
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

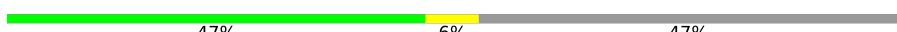
The reported resolution of this entry is 2.90 Å.

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	E	125	
2	A	211	
3	B	218	
4	C	221	
5	D	85	

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 6161 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 M688F nab.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	E	125	Total	C	N	O	S	0	0
			973	608	170	190	5		

- Molecule 2 is a protein called VP1 of capsid protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	A	191	Total	C	N	O	S	0	0
			1486	937	269	276	4		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	46	ASN	SER	conflict	UNP A0A7D5BJ70

- Molecule 3 is a protein called VP2 of capsid protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	B	207	Total	C	N	O	S	0	0
			1644	1049	286	304	5		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	14	THR	ILE	conflict	UNP A0A7D5BJ70

- Molecule 4 is a protein called VP3 of capsid protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	C	221	Total	C	N	O	S	0	0
			1709	1086	281	334	8		

- Molecule 5 is a protein called VP4 of capsid protein.

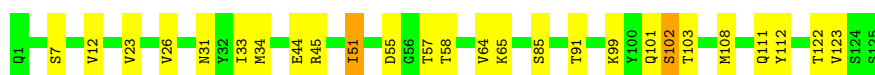
Mol	Chain	Residues	Atoms					AltConf	Trace
5	D	45	Total	C	N	O	S	0	0
			349	220	56	71	2		

3 Residue-property plots

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.

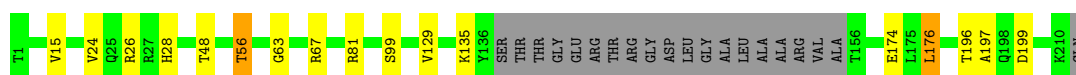
- Molecule 1: M688F nab

Chain E: 



- Molecule 2: VP1 of capsid protein

Chain A: 



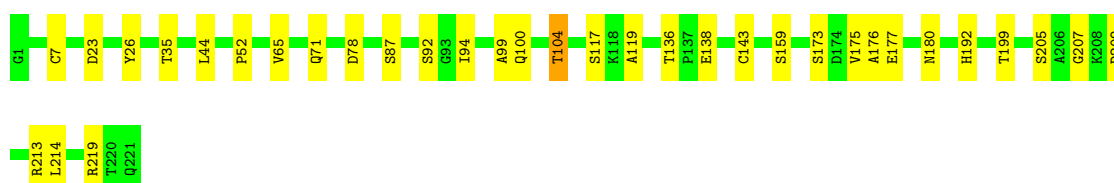
- Molecule 3: VP2 of capsid protein

Chain B: 

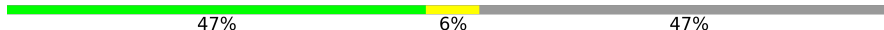


- Molecule 4: VP3 of capsid protein

Chain C: 



- Molecule 5: VP4 of capsid protein

Chain D: 

GLY	ALA	GLY	GLN	SER	PRO	ALA	THR	GLY	SER	GLN	ASN	GLN	S19	S20	L38	GLY	ASP	ASN	ALA	ILE	SER	GLY	GLY	SER	ASN	GLU	GLY	SER	THR	THR	THR	THR	SER	THR	HIS	THR	THR	ASN	THR	GLN	ASN	N65	S77	G78	L84	A85
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4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	25824	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING ONLY	Depositor
Microscope	FEI TALOS ARCTICA	Depositor
Voltage (kV)	200	Depositor
Electron dose ($e^-/\text{\AA}^2$)	30	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	2800	Depositor
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k 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	E	0.23	0/992	0.50	0/1341
2	A	0.30	0/1520	0.44	0/2073
3	B	0.31	0/1692	0.43	1/2303 (0.0%)
4	C	0.31	0/1757	0.43	0/2403
5	D	0.23	0/355	0.37	0/476
All	All	0.29	0/6316	0.44	1/8596 (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	30	VAL	N-CA-C	-5.64	107.79	113.20

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	E	973	0	943	11	0
2	A	1486	0	1477	8	0
3	B	1644	0	1612	11	0
4	C	1709	0	1631	13	0
5	D	349	0	321	1	0
All	All	6161	0	5984	44	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 4.

All (44) 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:E:33:ILE:HD13	1:E:108:MET:HG2	1.78	0.66
3:B:91:TYR:OH	3:B:103:ASN:ND2	2.29	0.65
1:E:51:ILE:HG13	1:E:58:THR:HG22	1.79	0.63
1:E:91:THR:HG23	1:E:122:THR:HA	1.80	0.62
3:B:85:THR:HG22	3:B:86:ASP:H	1.65	0.61
2:A:56:THR:O	2:A:67:ARG:NH2	2.34	0.61
4:C:104:THR:HB	4:C:207:GLY:HA3	1.83	0.59
4:C:52:PRO:HB3	4:C:205:SER:HB3	1.85	0.58
1:E:44:GLU:HG2	1:E:45:ARG:N	2.21	0.55
3:B:107:VAL:HG22	3:B:203:ILE:HG23	1.90	0.54
4:C:104:THR:OG1	4:C:209:ASP:OD1	2.21	0.54
1:E:99:LYS:HB2	1:E:112:TYR:CD2	2.43	0.53
2:A:63:GLY:O	2:A:67:ARG:HG2	2.08	0.53
2:A:199:ASP:N	2:A:199:ASP:OD1	2.42	0.53
5:D:77:SER:OG	5:D:78:GLY:N	2.42	0.53
3:B:37:SER:HB3	3:B:161:PRO:HG3	1.91	0.52
4:C:175:VAL:HG22	4:C:176:ALA:H	1.75	0.51
4:C:65:VAL:HG22	4:C:199:THR:HG22	1.93	0.51
2:A:81:ARG:HB3	2:A:174:GLU:HG3	1.94	0.50
1:E:31:ASN:HB3	1:E:103:THR:HG21	1.94	0.49
3:B:82:LYS:HB3	3:B:175:LYS:HD3	1.95	0.49
4:C:44:LEU:HB3	4:C:94:ILE:HD13	1.93	0.49
1:E:85:SER:O	1:E:85:SER:OG	2.30	0.48
1:E:101:GLN:HG2	1:E:102:SER:N	2.28	0.48
4:C:175:VAL:HG13	4:C:177:GLU:H	1.79	0.48
4:C:209:ASP:OD1	4:C:209:ASP:N	2.47	0.48
3:B:85:THR:HG22	3:B:86:ASP:N	2.29	0.47
1:E:12:VAL:HG23	1:E:123:VAL:HG23	1.95	0.47
3:B:91:TYR:O	3:B:95:VAL:HG23	2.15	0.46
3:B:100:TYR:HB3	3:B:168:TYR:HB3	1.97	0.46
2:A:174:GLU:OE1	2:A:176:LEU:HD13	2.16	0.45
3:B:93:HIS:O	3:B:97:SER:CB	2.65	0.45
2:A:196:THR:OG1	2:A:197:ALA:N	2.51	0.43
4:C:99:ALA:HB3	4:C:214:LEU:HB2	2.00	0.43
4:C:78:ASP:HB3	4:C:180:ASN:ND2	2.34	0.42
1:E:99:LYS:HG3	1:E:111:GLN:O	2.20	0.41
2:A:26:ARG:HB3	2:A:28:HIS:HD2	1.85	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:26:ARG:HB3	2:A:28:HIS:CD2	2.56	0.41
4:C:119:ALA:HA	4:C:192:HIS:HA	2.03	0.41
1:E:44:GLU:HG2	1:E:45:ARG:H	1.85	0.41
3:B:49:SER:O	3:B:49:SER:OG	2.36	0.41
4:C:136:THR:HG22	4:C:138:GLU:H	1.85	0.40
4:C:100:GLN:OE1	4:C:213:ARG:NH1	2.54	0.40
3:B:84:PRO:O	3:B:175:LYS:NZ	2.51	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	E	123/125 (98%)	115 (94%)	8 (6%)	0	100	100
2	A	187/211 (89%)	176 (94%)	11 (6%)	0	100	100
3	B	205/218 (94%)	195 (95%)	10 (5%)	0	100	100
4	C	219/221 (99%)	206 (94%)	13 (6%)	0	100	100
5	D	41/85 (48%)	40 (98%)	1 (2%)	0	100	100
All	All	775/860 (90%)	732 (94%)	43 (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	E	102/102 (100%)	92 (90%)	10 (10%)	6	21
2	A	158/171 (92%)	150 (95%)	8 (5%)	20	51
3	B	182/193 (94%)	169 (93%)	13 (7%)	12	36
4	C	184/185 (100%)	171 (93%)	13 (7%)	12	36
5	D	37/67 (55%)	34 (92%)	3 (8%)	9	29
All	All	663/718 (92%)	616 (93%)	47 (7%)	15	36

All (47) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	E	7	SER
1	E	23	VAL
1	E	26	VAL
1	E	34	MET
1	E	51	ILE
1	E	55	ASP
1	E	57	THR
1	E	64	VAL
1	E	65	LYS
1	E	102	SER
2	A	15	VAL
2	A	24	VAL
2	A	48	THR
2	A	56	THR
2	A	99	SER
2	A	129	VAL
2	A	135	LYS
2	A	176	LEU
3	B	17	THR
3	B	30	VAL
3	B	49	SER
3	B	53	THR
3	B	56	THR
3	B	120	CYS
3	B	131	LYS
3	B	140	LEU
3	B	149	SER
3	B	163	LEU
3	B	189	THR
3	B	195	THR
3	B	203	ILE

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Mol	Chain	Res	Type
4	C	7	CYS
4	C	23	ASP
4	C	26	TYR
4	C	35	THR
4	C	71	GLN
4	C	87	SER
4	C	92	SER
4	C	104	THR
4	C	117	SER
4	C	143	CYS
4	C	159	SER
4	C	173	SER
4	C	219	ARG
5	D	20	SER
5	D	38	LEU
5	D	84	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (13) such sidechains are listed below:

Mol	Chain	Res	Type
1	E	13	GLN
1	E	77	ASN
2	A	28	HIS
2	A	103	ASN
3	B	77	HIS
3	B	103	ASN
3	B	117	ASN
3	B	157	HIS
4	C	36	ASN
4	C	142	HIS
4	C	153	ASN
4	C	182	GLN
5	D	28	GLN

5.3.3 RNA ⓘ

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.