



wwPDB EM Map/Model Validation Report ⓘ

Aug 29, 2016 – 11:07 AM EDT

PDB ID : 5KEM
EMDB ID: : EMD-8241
Title : EBOV sGP in complex with variable Fab domains of IgGs c13C6 and BDBV91
Authors : Pallesen, J.; Murin, C.D.; de Val, N.; Cottrell, C.A.; Hastie, K.M.; Turner, H.L.; Fusco, M.L.; Flyak, A.I.; Zeitlin, L.; Crowe Jr., J.E.; Andersen, K.G.; Saphire, E.O.; Ward, A.B.
Deposited on : 2016-06-09
Resolution : 5.50 Å(reported)

This is a wwPDB EM Map/Model Validation Report for a publicly released PDB/EMDB entry.
For rigid body fitted models, validation errors reported here could stem from errors in the original structure(s) used in the fitting.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<http://wwpdb.org/validation/2016/EMValidationReportHelp>

MolProbity : 4.02b-467
Mogul : unknown
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP) : rb-20027939

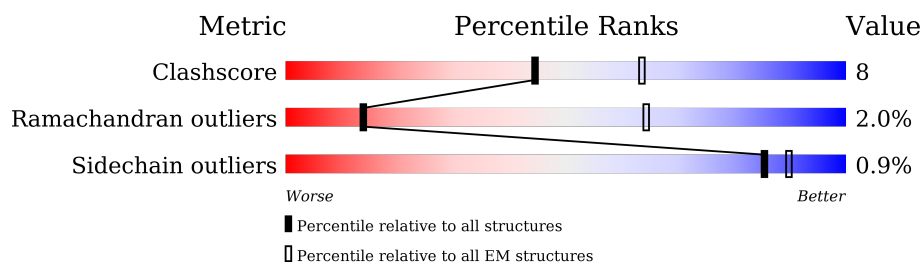
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 5.50 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	114402	924
Ramachandran outliers	111179	726
Sidechain outliers	111093	686

The table below summarises the geometric issues observed across the polymeric chains. The red, orange, yellow and green segments on the bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. 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	C	107	89% 11%
1	H	107	91% 9%
2	B	121	82% 12% . .
2	G	121	82% 12% . .
3	D	121	81% 14% 5%
3	I	121	80% 15% 5%
4	E	107	93% 7%
4	J	107	93% 7%
5	A	232	81% 16% .

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Mol	Chain	Length	Quality of chain
5	F	232	<div><div></div><div>82%</div><div>14%</div><div>.</div></div>

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 10616 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 BDBV91 variable Fab domain light chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	C	107	Total	C	N	O	S	0	0
			815	513	136	163	3		
1	H	107	Total	C	N	O	S	0	0
			815	513	136	163	3		

- Molecule 2 is a protein called BDBV91 variable Fab domain heavy chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	121	Total	C	N	O	S	0	0
			964	618	160	182	4		
2	G	121	Total	C	N	O	S	0	0
			964	618	160	182	4		

- Molecule 3 is a protein called c13C6 variable Fab domain heavy chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	D	121	Total	C	N	O	S	0	0
			930	593	154	180	3		
3	I	121	Total	C	N	O	S	0	0
			930	593	154	180	3		

- Molecule 4 is a protein called c13C6 variable Fab domain light chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	E	107	Total	C	N	O	S	0	0
			815	509	135	167	4		
4	J	107	Total	C	N	O	S	0	0
			815	509	135	167	4		

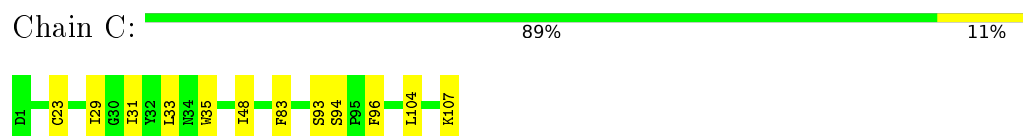
- Molecule 5 is a protein called Ebola secreted glycoprotein.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	A	232	Total	C	N	O	S	0	0
			1784	1137	301	342	4		
5	F	232	Total	C	N	O	S	0	0
			1784	1137	301	342	4		

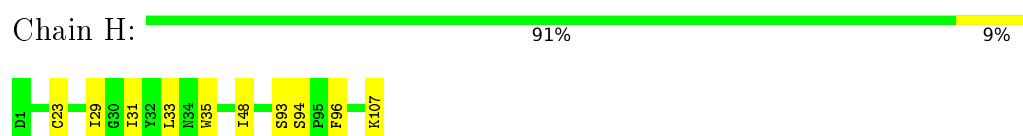
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

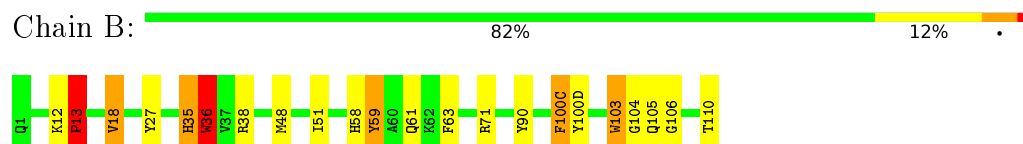
- Molecule 1: BDBV91 variable Fab domain light chain



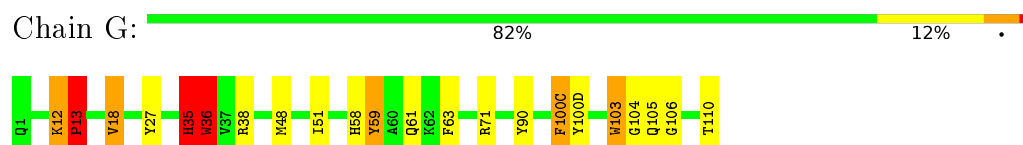
- Molecule 1: BDBV91 variable Fab domain light chain



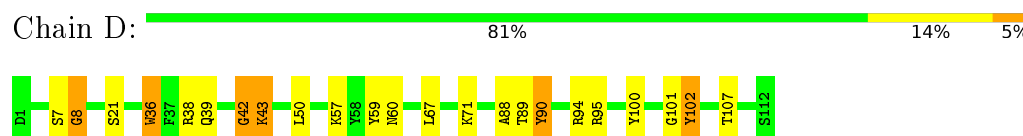
- Molecule 2: BDBV91 variable Fab domain heavy chain



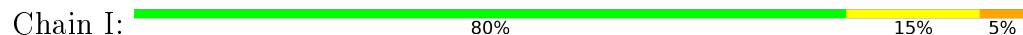
- Molecule 2: BDBV91 variable Fab domain heavy chain

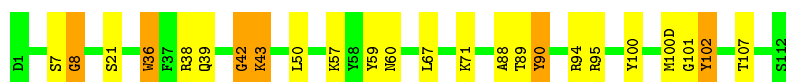


- Molecule 3: c13C6 variable Fab domain heavy chain



- Molecule 3: c13C6 variable Fab domain heavy chain





- Molecule 4: c13C6 variable Fab domain light chain

Chain E: 93% 7%



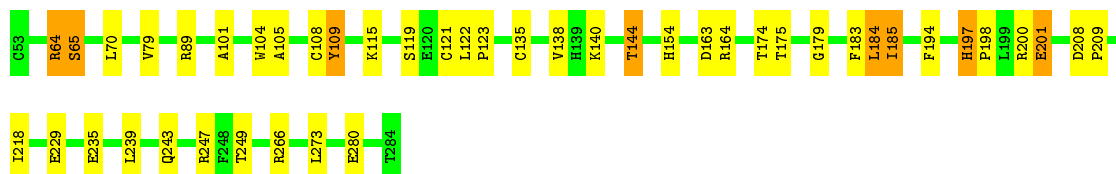
- Molecule 4: c13C6 variable Fab domain light chain

Chain J: 93% 7%



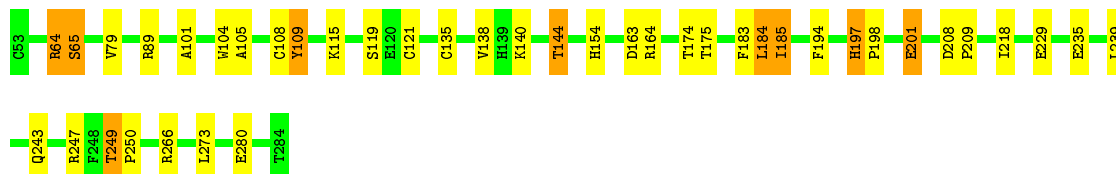
- Molecule 5: Ebola secreted glycoprotein

Chain A: 81% 16% .



- Molecule 5: Ebola secreted glycoprotein

Chain F: 82% 14% .



4 Experimental information

Property	Value	Source
Reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	Depositor
Number of particles used	39000	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	Not provided	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	Not provided	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	22500	Depositor
Image detector	Not provided	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 >2	RMSZ	# Z >2
1	C	0.79	0/833	0.94	0/1126
1	H	0.79	0/833	0.94	0/1126
2	B	0.83	0/992	1.13	7/1351 (0.5%)
2	G	0.83	0/992	1.13	8/1351 (0.6%)
3	D	0.83	0/954	1.04	3/1292 (0.2%)
3	I	0.83	0/954	1.05	3/1292 (0.2%)
4	E	0.76	0/831	0.90	2/1127 (0.2%)
4	J	0.76	0/831	0.90	2/1127 (0.2%)
5	A	0.92	1/1831 (0.1%)	1.03	2/2494 (0.1%)
5	F	0.92	1/1831 (0.1%)	1.03	2/2494 (0.1%)
All	All	0.85	2/10882 (0.0%)	1.02	29/14780 (0.2%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
2	B	0	7
2	G	0	7
3	D	0	3
3	I	0	3
5	A	0	8
5	F	0	8
All	All	0	36

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	201	GLU	CD-OE2	-5.17	1.20	1.25
5	F	201	GLU	CD-OE2	-5.13	1.20	1.25

The worst 5 of 29 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	12	LYS	C-N-CD	-9.95	98.71	120.60
2	G	12	LYS	C-N-CD	-9.93	98.76	120.60
2	B	27	TYR	CB-CG-CD2	-7.87	116.28	121.00
2	G	27	TYR	CB-CG-CD2	-7.87	116.28	121.00
4	J	98	PHE	CB-CG-CD2	7.61	126.13	120.80

There are no chirality outliers.

5 of 36 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	B	100(C)	PHE	Mainchain,Peptide
2	B	103	TRP	Mainchain,Peptide
2	B	35	HIS	Mainchain
2	B	58	HIS	Mainchain,Peptide
3	D	8	GLY	Mainchain

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	C	815	0	793	11	0
1	H	815	0	793	10	0
2	B	964	0	926	18	0
2	G	964	0	926	18	0
3	D	930	0	894	18	0
3	I	930	0	894	19	0
4	E	815	0	791	7	0
4	J	815	0	791	7	0
5	A	1784	0	1678	35	0
5	F	1784	0	1678	33	0
All	All	10616	0	10164	173	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 173 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:D:94:ARG:O	3:D:94:ARG:HD3	1.38	1.20
3:I:94:ARG:HD3	3:I:94:ARG:O	1.38	1.18
3:I:94:ARG:O	3:I:94:ARG:CD	2.22	0.88
3:D:94:ARG:O	3:D:94:ARG:CD	2.22	0.87
5:F:229:GLU:HG2	5:F:229:GLU:O	1.77	0.84

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	C	105/107 (98%)	101 (96%)	4 (4%)	0	100	100
1	H	105/107 (98%)	101 (96%)	4 (4%)	0	100	100
2	B	119/121 (98%)	106 (89%)	9 (8%)	4 (3%)	5	40
2	G	119/121 (98%)	106 (89%)	9 (8%)	4 (3%)	5	40
3	D	119/121 (98%)	110 (92%)	5 (4%)	4 (3%)	5	40
3	I	119/121 (98%)	110 (92%)	5 (4%)	4 (3%)	5	40
4	E	105/107 (98%)	102 (97%)	3 (3%)	0	100	100
4	J	105/107 (98%)	102 (97%)	2 (2%)	1 (1%)	19	64
5	A	230/232 (99%)	210 (91%)	15 (6%)	5 (2%)	8	49
5	F	230/232 (99%)	210 (91%)	15 (6%)	5 (2%)	8	49
All	All	1356/1376 (98%)	1258 (93%)	71 (5%)	27 (2%)	14	51

5 of 27 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	13	PRO
2	B	36	TRP
5	A	79	VAL

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Mol	Chain	Res	Type
5	A	184	LEU
2	G	13	PRO

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	C	92/92 (100%)	92 (100%)	0	100	100
1	H	92/92 (100%)	92 (100%)	0	100	100
2	B	103/103 (100%)	102 (99%)	1 (1%)	82	92
2	G	103/103 (100%)	102 (99%)	1 (1%)	82	92
3	D	99/99 (100%)	96 (97%)	3 (3%)	48	77
3	I	99/99 (100%)	96 (97%)	3 (3%)	48	77
4	E	92/92 (100%)	92 (100%)	0	100	100
4	J	92/92 (100%)	92 (100%)	0	100	100
5	A	184/197 (93%)	183 (100%)	1 (0%)	92	96
5	F	184/197 (93%)	183 (100%)	1 (0%)	92	96
All	All	1140/1166 (98%)	1130 (99%)	10 (1%)	85	93

5 of 10 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
5	A	197	HIS
2	G	13	PRO
3	I	38	ARG
3	D	71	LYS
3	I	36	TRP

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
4	E	89	GLN

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Mol	Chain	Res	Type
4	J	89	GLN

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 carbohydrates 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.