



## wwPDB/EMDatabank EM Map/Model Validation Summary Report

Mar 2, 2017 – 11:18 am GMT

PDB ID : 3IY4  
EMDB ID: : EMD-5109  
Title : Variable domains of the computer generated model (WAM) of Fab 15 fitted into the cryoEM reconstruction of the virus-Fab 15 complex  
Authors : Hafenstein, S.; Bowman, V.D.; Sun, T.; Nelson, C.D.; Palermo, L.M.; Chipman, P.R.; Battisti, A.J.; Parrish, C.R.; Rossmann, M.G.  
Deposited on : 2009-04-09  
Resolution : 11.70 Å(reported)

This is a wwPDB/EMDatabank EM Map/Model Validation Summary Report for a publicly released PDB/EMDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)  
A user guide is available at  
<http://wwpdb.org/validation/2016/EMValidationReportHelp>  
with specific help available everywhere you see the  symbol.

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MolProbity : 4.02b-467  
Percentile statistics : 20161228.v01 (using entries in the PDB archive December 28th 2016)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)  
Validation Pipeline (wwPDB-VP) : recalc29047

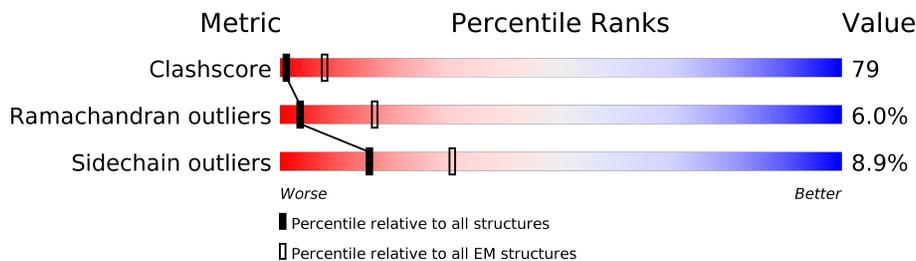
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 11.70 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	125131	1336
Ramachandran outliers	121729	1120
Sidechain outliers	121581	1026

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  $\geq 3$ , 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	A	111	 41% 48% 9% .
2	B	111	 37% 32% 22% 10%

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 1713 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 fragment of neutralizing antibody 15 (light chain).

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	111	841	524	140	173	4	0	0

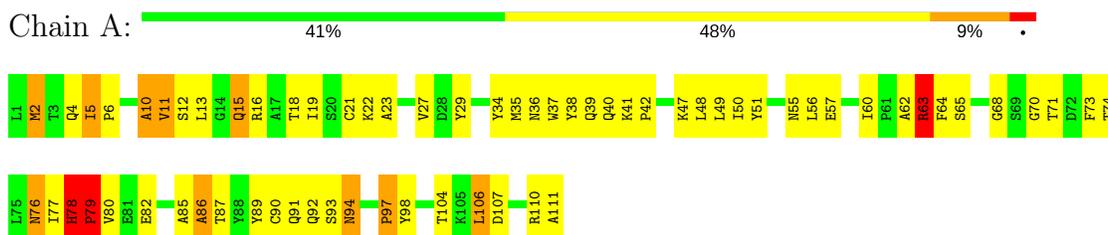
- Molecule 2 is a protein called fragment of neutralizing antibody 15 (heavy chain).

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	111	872	560	143	164	5	0	0

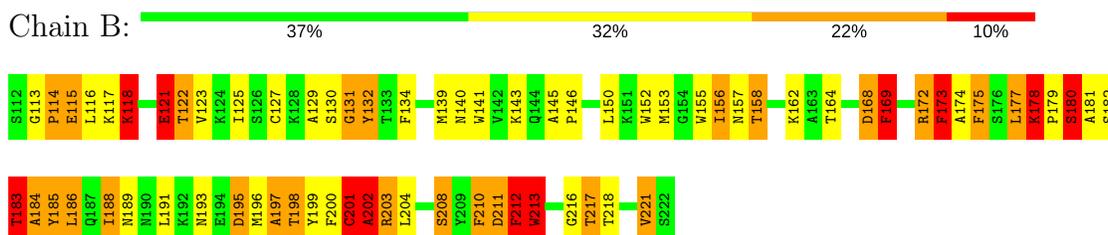
### 3 Residue-property plots

These plots are drawn for all protein, RNA and DNA 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: fragment of neutralizing antibody 15 (light chain)



- Molecule 2: fragment of neutralizing antibody 15 (heavy chain)



## 4 Experimental information

Property	Value	Source
Reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	Depositor
Number of particles used	4798	Depositor
Resolution determination method	FSC at 0.5 cutoff	Depositor
CTF correction method	robem	Depositor
Microscope	Not provided	Depositor
Voltage (kV)	300	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	34.52	Depositor
Minimum defocus (nm)	0.9	Depositor
Maximum defocus (nm)	3.4	Depositor
Magnification	47190	Depositor
Image detector	Kodak SO-163 film	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  >2	RMSZ	# Z  >2
1	A	1.05	3/860 (0.3%)	1.60	13/1166 (1.1%)
2	B	1.86	14/897 (1.6%)	2.48	54/1210 (4.5%)
All	All	1.52	17/1757 (1.0%)	2.10	67/2376 (2.8%)

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
1	A	1	4
2	B	1	10
All	All	2	14

The worst 5 of 17 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	213	TRP	NE1-CE2	-20.86	1.10	1.37
2	B	180	SER	CA-CB	17.72	1.79	1.52
2	B	180	SER	CB-OG	17.58	1.65	1.42
2	B	169	PHE	CE1-CZ	-9.84	1.18	1.37
2	B	213	TRP	CD2-CE3	-8.81	1.27	1.40

The worst 5 of 67 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	180	SER	CB-CA-C	-27.91	57.08	110.10
2	B	180	SER	N-CA-CB	20.13	140.70	110.50
1	A	78	HIS	CG-ND1-CE1	-17.85	82.50	105.70
2	B	169	PHE	CD1-CE1-CZ	-17.77	98.77	120.10
2	B	188	ILE	CA-CB-CG2	15.89	142.68	110.90

All (2) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
1	A	63	ARG	CA
2	B	212	PHE	CA

5 of 14 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	62	ALA	Peptide
1	A	63	ARG	Mainchain
1	A	78	HIS	Sidechain,Mainchain
2	B	121	GLU	Mainchain,Peptide
2	B	131	GLY	Peptide

## 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	841	0	801	91	0
2	B	872	0	837	181	0
All	All	1713	0	1638	263	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 79.

The worst 5 of 263 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:180:SER:OG	2:B:180:SER:CB	1.65	1.43
2:B:118:LYS:HE3	2:B:121:GLU:CG	1.71	1.19
2:B:118:LYS:CE	2:B:121:GLU:HG3	1.77	1.14
2:B:153:MET:HE1	2:B:186:LEU:CG	1.82	1.09
2:B:212:PHE:HA	2:B:213:TRP:HB3	1.35	1.05

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	109/111 (98%)	102 (94%)	3 (3%)	4 (4%)	4	33
2	B	109/111 (98%)	94 (86%)	6 (6%)	9 (8%)	1	16
All	All	218/222 (98%)	196 (90%)	9 (4%)	13 (6%)	3	23

5 of 13 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	63	ARG
1	A	79	PRO
1	A	86	ALA
2	B	115	GLU
2	B	121	GLU

### 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	90/90 (100%)	82 (91%)	8 (9%)	11	39
2	B	90/90 (100%)	82 (91%)	8 (9%)	11	39
All	All	180/180 (100%)	164 (91%)	16 (9%)	16	39

5 of 16 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	106	LEU

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Mol	Chain	Res	Type
2	B	118	LYS
2	B	183	THR
1	A	76	ASN
2	B	198	THR

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

Mol	Chain	Res	Type
1	A	76	ASN
1	A	94	ASN

### 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.