Full wwPDB X-ray Structure Validation Report ⓘ

May 16, 2020 – 01:34 am BST

PDB ID	:	5TGB
Title	:	Structure of chimeric 02-CB Fab, a VRC01-like germline antibody
Authors	:	Pancera, M.
Deposited on	:	2016-09-27
Resolution	:	2.74 Å(reported)

This is a Full wwPDB X-ray Structure 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/XrayValidationReportHelp
with specific help available everywhere you see the ⓘ symbol.

The following versions of software and data (see references ①) were used in the production of this report:

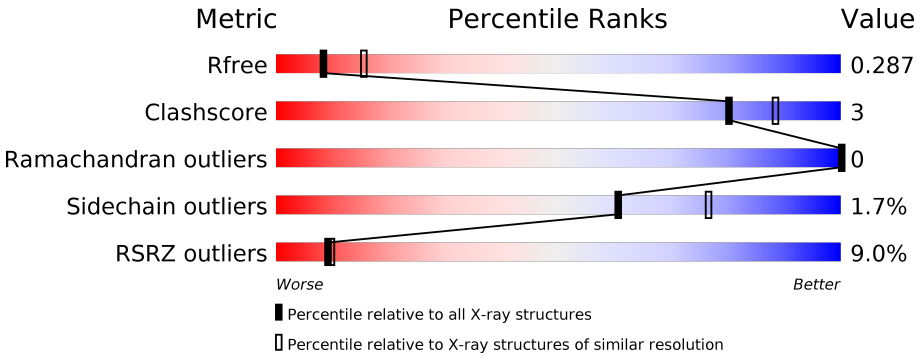
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.11
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.74 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)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1271 (2.76-2.72)
Clashscore	141614	1322 (2.76-2.72)
Ramachandran outliers	138981	1297 (2.76-2.72)
Sidechain outliers	138945	1298 (2.76-2.72)
RSRZ outliers	127900	1243 (2.76-2.72)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower 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 <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	223	12% 92% 6% ·
1	H	223	10% 86% 8% 6%
2	B	210	4% 91% 7% ·
2	L	210	9% 91% 8% ·

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 12738 atoms, of which 6245 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, 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 02-CB Fab Heavy Chain.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	H	210	Total	C	H	N	O	S	0	0	0
			3154	1018	1550	269	309	8			
1	A	221	Total	C	H	N	O	S	0	0	0
			3286	1053	1618	282	325	8			

- Molecule 2 is a protein called 02-CB Fab Light Chain.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
2	L	208	Total	C	H	N	O	S	0	0	0
			3144	1007	1540	269	324	4			
2	B	207	Total	C	H	N	O	S	0	0	0
			3136	1004	1537	268	323	4			

- Molecule 3 is water.

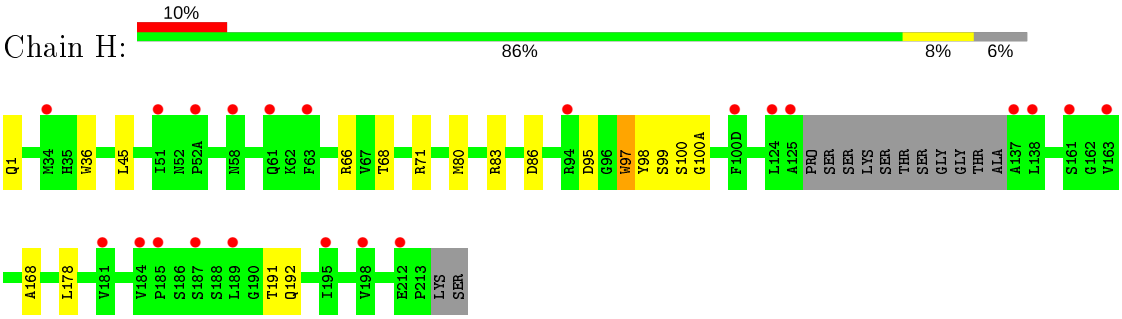
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	H	4	Total	O	0	0
			4	4		
3	L	7	Total	O	0	0
			7	7		
3	A	6	Total	O	0	0
			6	6		
3	B	1	Total	O	0	0
			1	1		

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 the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). 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.

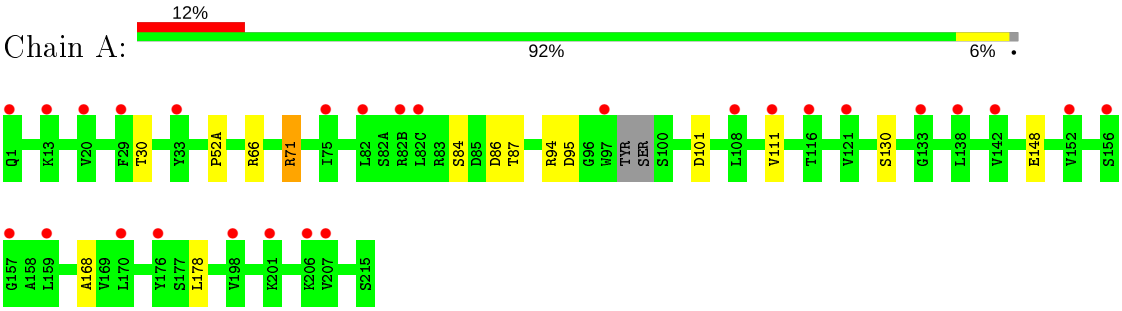
- Molecule 1: 02-CB Fab Heavy Chain

Chain H:



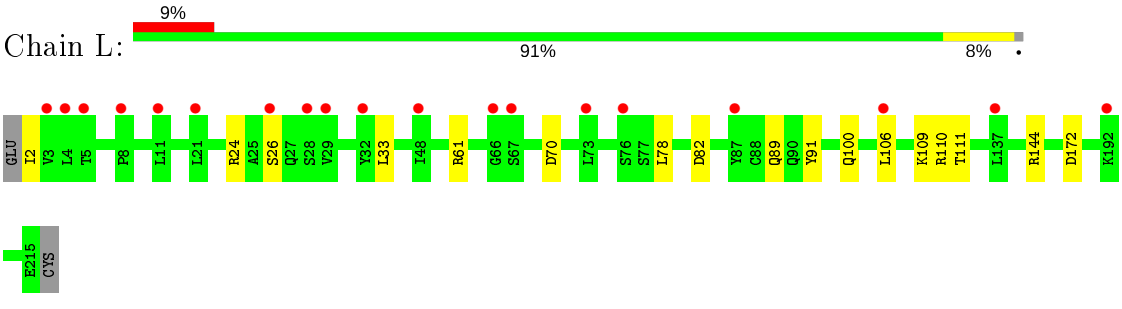
- Molecule 1: 02-CB Fab Heavy Chain

Chain A:



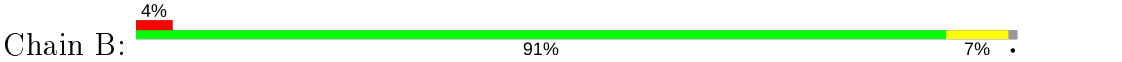
- Molecule 2: 02-CB Fab Light Chain

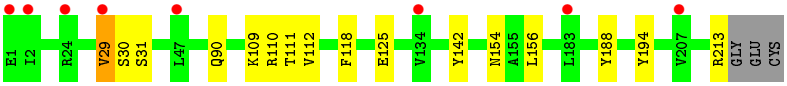
Chain L:



- Molecule 2: 02-CB Fab Light Chain

Chain B:




E1
I2
R24
V29
S30
S31
L47
Q90
K109
R110
T111
V112
F118
E125
V134
Y142
N154
A155
L156
L183
Y188
Y194
V207
R213
GLY
GLU
CYS

4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	199.79Å 64.64Å 81.28Å 90.00° 101.49° 90.00°	Depositor
Resolution (Å)	47.21 – 2.74 48.95 – 2.74	Depositor EDS
% Data completeness (in resolution range)	94.0 (47.21-2.74) 94.1 (48.95-2.74)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.63 (at 2.73Å)	Xtriage
Refinement program	PHENIX 1.10.1_2155	Depositor
R, R_{free}	0.249 , 0.286 0.251 , 0.287	Depositor DCC
R_{free} test set	1291 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å^2)	58.5	Xtriage
Anisotropy	0.506	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.40 , 31.2	EDS
L-test for twinning[2]	$< \|L\| > = 0.51$, $< L^2 > = 0.35$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.91	EDS
Total number of atoms	12738	wwPDB-VP
Average B, all atoms (Å^2)	77.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.90% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

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	#$\|Z\|>5$	RMSZ	#$\|Z\|>5$
1	A	0.26	0/1712	0.46	0/2331
1	H	0.27	0/1648	0.47	0/2246
2	B	0.28	0/1634	0.47	0/2219
2	L	0.27	0/1639	0.46	0/2226
All	All	0.27	0/6633	0.46	0/9022

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

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	1668	1618	1618	9	1
1	H	1604	1550	1549	8	2
2	B	1599	1537	1551	8	1
2	L	1604	1540	1555	11	0
3	A	6	0	0	1	0
3	B	1	0	0	1	0
3	H	4	0	0	1	0
3	L	7	0	0	1	0
All	All	6493	6245	6273	34	2

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 3.

All (34) 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:H:66:ARG:NH2	1:H:86:ASP:OD2	2.30	0.64
1:A:66:ARG:NH2	1:A:86:ASP:OD2	2.35	0.60
1:A:87:THR:HG22	1:A:111:VAL:H	1.67	0.58
2:L:89:GLN:NE2	2:L:91:TYR:O	2.38	0.56
1:A:148:GLU:OE2	3:A:301:HOH:O	2.17	0.56
2:B:110:ARG:NH1	2:B:111:THR:O	2.40	0.54
2:L:2:ILE:N	2:L:26:SER:HG	2.05	0.54
2:B:30:SER:O	2:B:31:SER:HB2	2.07	0.53
2:L:2:ILE:N	2:L:26:SER:OG	2.42	0.52
1:H:45:LEU:N	3:H:302:HOH:O	2.45	0.50
1:H:99:SER:OG	1:H:100:SER:N	2.44	0.50
2:L:110:ARG:NH1	2:L:111:THR:O	2.45	0.50
1:H:97:TRP:HZ3	1:H:100:SER:HG	1.59	0.49
1:H:168:ALA:HA	1:H:178:LEU:HB3	1.95	0.49
1:H:191:THR:OG1	1:H:192:GLN:N	2.47	0.48
1:A:52(A):PRO:HA	1:A:71:ARG:HD2	1.95	0.48
2:L:24:ARG:NH1	2:L:70:ASP:OD2	2.46	0.48
2:L:110:ARG:HG2	2:L:110:ARG:HH11	1.80	0.47
2:L:144:ARG:NH1	3:L:301:HOH:O	2.37	0.47
2:L:110:ARG:NE	2:L:172:ASP:O	2.48	0.46
2:B:213:ARG:O	3:B:301:HOH:O	2.21	0.46
1:A:84:SER:O	1:A:87:THR:HG23	2.16	0.46
1:H:100(A):GLY:HA2	2:L:91:TYR:CE1	2.51	0.45
1:A:168:ALA:HA	1:A:178:LEU:HB3	1.98	0.45
1:A:30:THR:HA	1:A:52(A):PRO:HB2	1.99	0.45
1:H:36:TRP:CE2	1:H:80:MET:HB2	2.51	0.45
1:A:94:ARG:NH2	1:A:101:ASP:OD2	2.47	0.44
2:B:188:TYR:O	2:B:194:TYR:OH	2.33	0.43
2:B:112:VAL:HG13	2:B:142:TYR:O	2.19	0.43
2:L:78:LEU:HD21	2:L:106:LEU:HD21	2.01	0.43
2:L:61:ARG:NE	2:L:82:ASP:OD2	2.51	0.42
2:B:29:VAL:HB	2:B:90:GLN:OE1	2.19	0.42
2:B:125:GLU:N	2:B:125:GLU:OE1	2.41	0.42
1:A:130:SER:HA	2:B:118:PHE:HD1	1.86	0.40

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:H:98:TYR:OH	1:A:95:ASP:OD2[4_645]	1.88	0.32
1:H:68:THR:OG1	2:B:109:LYS:HZ2[3_545]	1.60	0.00

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 X-ray entries followed by that with respect to entries of similar resolution.

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	217/223 (97%)	213 (98%)	4 (2%)	0	100	100
1	H	206/223 (92%)	200 (97%)	6 (3%)	0	100	100
2	B	205/210 (98%)	196 (96%)	9 (4%)	0	100	100
2	L	206/210 (98%)	193 (94%)	13 (6%)	0	100	100
All	All	834/866 (96%)	802 (96%)	32 (4%)	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 X-ray entries followed by that with respect to entries of similar resolution.

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	185/187 (99%)	184 (100%)	1 (0%)	88	92
1	H	177/187 (95%)	172 (97%)	5 (3%)	43	63
2	B	180/182 (99%)	177 (98%)	3 (2%)	60	76
2	L	180/182 (99%)	177 (98%)	3 (2%)	60	76
All	All	722/738 (98%)	710 (98%)	12 (2%)	60	76

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	H	1	GLN
1	H	71	ARG
1	H	83	ARG
1	H	95	ASP
1	H	97	TRP
2	L	33	LEU
2	L	100	GLN
2	L	109	LYS
1	A	71	ARG
2	B	29	VAL
2	B	154	ASN
2	B	156	LEU

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

5.3.3 RNA

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates

There are no carbohydrates in this entry.

5.6 Ligand geometry

There are no ligands in this entry.

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95^{th} percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å^2)	Q<0.9
1	A	221/223 (99%)	0.90	27 (12%) 4 4	47, 76, 97, 115	0
1	H	210/223 (94%)	0.94	22 (10%) 6 6	46, 67, 98, 133	0
2	B	207/210 (98%)	0.92	8 (3%) 39 43	43, 62, 88, 103	0
2	L	208/210 (99%)	0.88	19 (9%) 9 9	51, 70, 91, 114	0
All	All	846/866 (97%)	0.91	76 (8%) 9 10	43, 69, 95, 133	0

All (76) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	H	125	ALA	5.9
1	H	189	LEU	5.9
1	H	187	SER	4.6
1	H	184	VAL	4.6
2	L	5	THR	3.8
1	H	185	PRO	3.7
2	L	26	SER	3.6
1	H	163	VAL	3.5
2	L	106	LEU	3.5
2	L	21	LEU	3.4
1	H	138	LEU	3.3
1	A	1	GLN	3.3
1	A	97	TRP	3.2
1	A	170	LEU	3.2
2	L	11	LEU	3.2
1	A	157	GLY	3.1
1	A	152	VAL	3.1
2	B	207	VAL	3.0
1	A	82(B)	ARG	3.0
2	B	1	GLU	3.0
1	H	61	GLN	2.9

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Mol	Chain	Res	Type	RSRZ
1	A	20	VAL	2.9
1	H	124	LEU	2.9
2	B	183	LEU	2.9
2	L	73	LEU	2.8
2	L	67	SER	2.8
1	A	142	VAL	2.8
2	B	134	VAL	2.8
1	H	198	VAL	2.8
2	L	66	GLY	2.8
1	A	198	VAL	2.7
1	A	111	VAL	2.7
2	B	29	VAL	2.7
2	L	76	SER	2.7
2	L	3	VAL	2.7
2	B	24	ARG	2.6
1	H	137	ALA	2.6
2	L	28	SER	2.6
1	A	159	LEU	2.5
1	A	201	LYS	2.5
1	A	108	LEU	2.5
1	A	29	PHE	2.5
2	L	29	VAL	2.5
2	L	32	TYR	2.5
1	H	34	MET	2.4
1	A	133	GLY	2.4
1	H	63	PHE	2.4
1	H	51	ILE	2.4
1	H	94	ARG	2.4
2	B	47	LEU	2.4
1	A	13	LYS	2.4
1	A	121	VAL	2.4
1	H	212	GLU	2.3
1	H	100(D)	PHE	2.3
2	L	87	TYR	2.3
1	A	176	TYR	2.3
1	A	138	LEU	2.3
2	L	4	LEU	2.3
1	H	181	VAL	2.3
2	L	8	PRO	2.3
2	B	2	ILE	2.3
1	A	207	VAL	2.3
1	H	52(A)	PRO	2.3

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Mol	Chain	Res	Type	RSRZ
2	L	48	ILE	2.2
1	A	206	LYS	2.2
1	H	161	SER	2.2
1	A	75	ILE	2.2
1	A	82	LEU	2.1
1	A	33	TYR	2.1
2	L	137	LEU	2.1
1	H	58	ASN	2.1
1	A	82(C)	LEU	2.1
2	L	192	LYS	2.0
1	H	195	ILE	2.0
1	A	156	SER	2.0
1	A	116	THR	2.0

6.2 Non-standard residues in protein, DNA, RNA chains

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates

There are no carbohydrates in this entry.

6.4 Ligands

There are no ligands in this entry.

6.5 Other polymers

There are no such residues in this entry.