



wwPDB X-ray Structure Validation Summary Report ⓘ

Sep 10, 2023 – 11:09 PM EDT

PDB ID : 4JZO
Title : Three dimensional structure of broadly neutralizing human anti - Hepatitis C virus (HCV) glycoprotein E2 Fab fragment HC84-27
Authors : Krey, T.; Rey, F.A.
Deposited on : 2013-04-03
Resolution : 2.22 Å(reported)

This is a wwPDB X-ray Structure 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/XrayValidationReportHelp>

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:

MolProbity : 4.02b-467
Xtriage (Phenix) : 1.13
EDS : 2.35.1
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) : 2.35.1

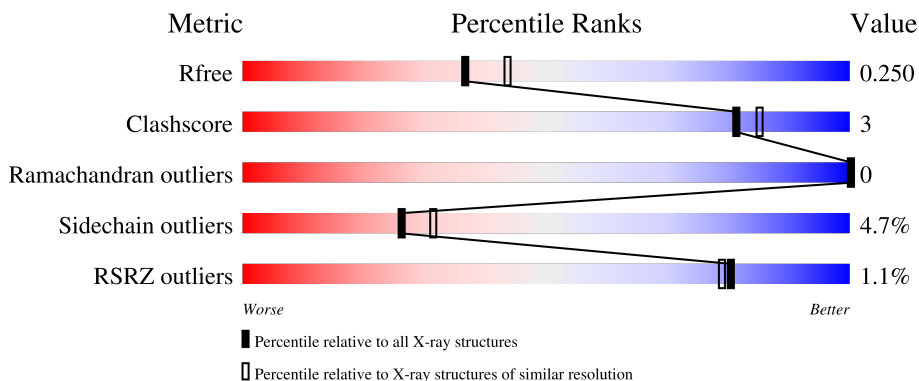
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.22 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	5912 (2.24-2.20)
Clashscore	141614	6646 (2.24-2.20)
Ramachandran outliers	138981	6543 (2.24-2.20)
Sidechain outliers	138945	6544 (2.24-2.20)
RSRZ outliers	127900	5797 (2.24-2.20)

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 of 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 $\leq 5\%$. 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	261	<div style="display: flex; align-items: center;"> <div style="width: 2%; height: 10px; background-color: red; margin-right: 2px;"></div> <div style="width: 73%; height: 10px; background-color: green; margin-right: 2px;"></div> <div style="width: 10%; height: 10px; background-color: yellow; margin-right: 2px;"></div> <div style="width: 18%; height: 10px; background-color: grey;"></div> </div> <p style="text-align: center;">73% 10% 18%</p>
1	C	261	<div style="display: flex; align-items: center;"> <div style="width: 2%; height: 10px; background-color: red; margin-right: 2px;"></div> <div style="width: 72%; height: 10px; background-color: green; margin-right: 2px;"></div> <div style="width: 8%; height: 10px; background-color: yellow; margin-right: 2px;"></div> <div style="width: 18%; height: 10px; background-color: grey;"></div> </div> <p style="text-align: center;">72% 8% 18%</p>
1	D	261	<div style="display: flex; align-items: center;"> <div style="width: 2%; height: 10px; background-color: red; margin-right: 2px;"></div> <div style="width: 74%; height: 10px; background-color: green; margin-right: 2px;"></div> <div style="width: 8%; height: 10px; background-color: yellow; margin-right: 2px;"></div> <div style="width: 18%; height: 10px; background-color: grey;"></div> </div> <p style="text-align: center;">74% 8% 18%</p>
1	G	261	<div style="display: flex; align-items: center;"> <div style="width: 2%; height: 10px; background-color: red; margin-right: 2px;"></div> <div style="width: 74%; height: 10px; background-color: green; margin-right: 2px;"></div> <div style="width: 9%; height: 10px; background-color: yellow; margin-right: 2px;"></div> <div style="width: 17%; height: 10px; background-color: grey;"></div> </div> <p style="text-align: center;">74% 9% 17%</p>
2	B	215	<div style="display: flex; align-items: center;"> <div style="width: 92%; height: 10px; background-color: green; margin-right: 2px;"></div> <div style="width: 6%; height: 10px; background-color: yellow; margin-right: 2px;"></div> <div style="width: 2%; height: 10px; background-color: grey;"></div> </div> <p style="text-align: center;">92% 6%</p>

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Mol	Chain	Length	Quality of chain
2	E	215	 89% 8% ..
2	F	215	 89% 8% ..
2	H	215	 89% 7% ..
3	I	13	 69% 15% 15%
3	J	13	 15% 85% 15%
3	K	13	 8% 69% 15% 15%
3	L	13	 23% 62% 23% 15%

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 13544 atoms, of which 0 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 Anti-HCV E2 Fab HC84-27 heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	215	Total 1612	C 1019	N 265	O 317	S 11	0	4	0
1	C	214	Total 1597	C 1010	N 263	O 315	S 9	0	2	0
1	D	214	Total 1600	C 1012	N 264	O 315	S 9	0	2	0
1	G	217	Total 1618	C 1022	N 267	O 320	S 9	0	2	0

- Molecule 2 is a protein called Anti-HCV E2 Fab HC84-27 light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	211	Total 1613	C 1005	N 272	O 329	S 7	0	2	0
2	E	211	Total 1613	C 1005	N 272	O 329	S 7	0	2	0
2	F	210	Total 1613	C 1006	N 271	O 327	S 9	0	4	0
2	H	210	Total 1601	C 998	N 271	O 327	S 5	0	0	0

- Molecule 3 is a protein called Envelope glycoprotein E2.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	I	11	Total 94	C 65	N 16	O 13	0	0	0
3	J	11	Total 94	C 65	N 16	O 13	0	0	0
3	K	11	Total 94	C 65	N 16	O 13	0	0	0
3	L	11	Total 94	C 65	N 16	O 13	0	0	0

- Molecule 4 is water.


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	27	Total O 27 27	0	0
4	B	48	Total O 48 48	0	0
4	C	24	Total O 24 24	0	0
4	D	33	Total O 33 33	0	0
4	E	50	Total O 50 50	0	0
4	F	40	Total O 40 40	0	0
4	G	26	Total O 26 26	0	0
4	H	52	Total O 52 52	0	0
4	I	1	Total O 1 1	0	0

- Molecule 2: Anti-HCV E2 Fab HC84-27 light chain

Chain B:  92% 6%




- Molecule 2: Anti-HCV E2 Fab HC84-27 light chain

Chain E:  89% 8%




- Molecule 2: Anti-HCV E2 Fab HC84-27 light chain

Chain F:  89% 8%



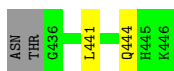
- Molecule 2: Anti-HCV E2 Fab HC84-27 light chain

Chain H:  89% 7%




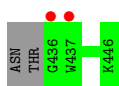
- Molecule 3: Envelope glycoprotein E2

Chain I:  69% 15% 15%



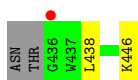
- Molecule 3: Envelope glycoprotein E2

Chain J:  15% 85% 15%

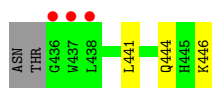


- Molecule 3: Envelope glycoprotein E2

Chain K:  8% 69% 15% 15%



- Molecule 3: Envelope glycoprotein E2



4 Data and refinement statistics i

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	75.94Å 77.33Å 85.82Å 92.10° 107.62° 90.24°	Depositor
Resolution (Å)	41.35 – 2.22 41.35 – 2.22	Depositor EDS
% Data completeness (in resolution range)	85.8 (41.35-2.22) 85.8 (41.35-2.22)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.00 (at 2.22Å)	Xtrriage
Refinement program	BUSTER 2.11.2	Depositor
R, R_{free}	0.196 , 0.236 0.209 , 0.250	Depositor DCC
R_{free} test set	3996 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å ²)	35.2	Xtrriage
Anisotropy	0.400	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 29.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtrriage
Estimated twinning fraction	0.137 for -h,k,-l	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	13544	wwPDB-VP
Average B, all atoms (Å ²)	40.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 10.50% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

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	A	0.49	0/1662	0.68	0/2265
1	C	0.52	0/1641	0.73	0/2237
1	D	0.49	0/1644	0.69	0/2241
1	G	0.52	0/1662	0.73	0/2264
2	B	0.52	0/1654	0.73	0/2251
2	E	0.55	0/1654	0.71	0/2251
2	F	0.54	0/1660	0.70	0/2259
2	H	0.53	0/1636	0.70	0/2227
3	I	0.60	0/98	0.79	0/131
3	J	0.55	0/98	0.71	0/131
3	K	0.48	0/98	0.62	0/131
3	L	0.50	0/98	0.72	0/131
All	All	0.52	0/13605	0.71	0/18519

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 [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	1612	0	1582	11	0
1	C	1597	0	1563	12	0
1	D	1600	0	1569	11	0
1	G	1618	0	1586	11	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	1613	0	1562	3	0
2	E	1613	0	1562	6	0
2	F	1613	0	1562	8	0
2	H	1601	0	1546	9	0
3	I	94	0	88	0	0
3	J	94	0	88	0	0
3	K	94	0	88	1	0
3	L	94	0	88	1	0
4	A	27	0	0	0	0
4	B	48	0	0	0	0
4	C	24	0	0	0	0
4	D	33	0	0	0	0
4	E	50	0	0	0	0
4	F	40	0	0	0	0
4	G	26	0	0	0	0
4	H	52	0	0	1	0
4	I	1	0	0	0	0
All	All	13544	0	12884	67	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 3.

The worst 5 of 67 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:G:101:LEU:HD22	1:G:101:LEU:H	1.51	0.74
1:D:15:GLY:HA2	2:H:168:LYS:HD3	1.79	0.62
1:A:29:LEU:HD22	1:A:34:ILE:HD13	1.80	0.62
1:D:85:ASN:HB3	2:H:168:LYS:HG2	1.83	0.61
1:D:87:ARG:HD2	1:D:89:GLU:HB2	1.82	0.61

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 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	215/261 (82%)	211 (98%)	4 (2%)	0	100	100
1	C	212/261 (81%)	207 (98%)	5 (2%)	0	100	100
1	D	212/261 (81%)	207 (98%)	5 (2%)	0	100	100
1	G	215/261 (82%)	210 (98%)	5 (2%)	0	100	100
2	B	211/215 (98%)	205 (97%)	6 (3%)	0	100	100
2	E	211/215 (98%)	206 (98%)	5 (2%)	0	100	100
2	F	212/215 (99%)	208 (98%)	4 (2%)	0	100	100
2	H	208/215 (97%)	203 (98%)	5 (2%)	0	100	100
3	I	9/13 (69%)	9 (100%)	0	0	100	100
3	J	9/13 (69%)	9 (100%)	0	0	100	100
3	K	9/13 (69%)	9 (100%)	0	0	100	100
3	L	9/13 (69%)	9 (100%)	0	0	100	100
All	All	1732/1956 (88%)	1693 (98%)	39 (2%)	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	181/212 (85%)	175 (97%)	6 (3%)	38	47
1	C	178/212 (84%)	170 (96%)	8 (4%)	27	33
1	D	178/212 (84%)	173 (97%)	5 (3%)	43	54
1	G	181/212 (85%)	172 (95%)	9 (5%)	24	28
2	B	184/186 (99%)	175 (95%)	9 (5%)	25	29
2	E	184/186 (99%)	174 (95%)	10 (5%)	22	25
2	F	185/186 (100%)	178 (96%)	7 (4%)	33	41

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	H	181/186 (97%)	171 (94%)	10 (6%)	21	24
3	I	8/10 (80%)	6 (75%)	2 (25%)	0	0
3	J	8/10 (80%)	8 (100%)	0	100	100
3	K	8/10 (80%)	7 (88%)	1 (12%)	4	3
3	L	8/10 (80%)	6 (75%)	2 (25%)	0	0
All	All	1484/1632 (91%)	1415 (95%)	69 (5%)	26	32

5 of 69 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	H	55	SER
2	H	99	THR
3	I	444	GLN
1	D	57	THR
1	D	10	GLU

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

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 monosaccharides 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.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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, 95th 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	215/261 (82%)	-0.30	2 (0%) 84 83	25, 41, 66, 87	0
1	C	214/261 (81%)	-0.24	3 (1%) 75 73	24, 40, 66, 94	0
1	D	214/261 (81%)	-0.38	3 (1%) 75 73	25, 38, 63, 78	0
1	G	217/261 (83%)	-0.21	5 (2%) 60 58	24, 40, 70, 98	0
2	B	211/215 (98%)	-0.46	0 100 100	22, 35, 56, 73	0
2	E	211/215 (98%)	-0.50	0 100 100	21, 34, 54, 74	0
2	F	210/215 (97%)	-0.47	1 (0%) 91 90	21, 35, 52, 63	0
2	H	210/215 (97%)	-0.46	0 100 100	22, 36, 55, 71	0
3	I	11/13 (84%)	-0.18	0 100 100	33, 45, 64, 65	0
3	J	11/13 (84%)	0.96	2 (18%) 1 1	37, 60, 91, 93	0
3	K	11/13 (84%)	0.38	1 (9%) 9 7	47, 50, 65, 70	0
3	L	11/13 (84%)	1.72	3 (27%) 0 0	57, 69, 96, 97	0
All	All	1746/1956 (89%)	-0.35	20 (1%) 80 79	21, 38, 64, 98	0

The worst 5 of 20 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	J	437	TRP	5.5
3	L	437	TRP	5.3
1	A	75	SER	4.6
1	C	76	THR	4.4
1	D	75	SER	3.2

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

6.4 Ligands [i](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.