Full wwPDB X-ray Structure Validation Report (i)

Jun 12, 2024 – 08:41 PM EDT

PDB ID	:	1FOR
Title	:	STRUCTURE DETERMINATION OF AN FAB FRAGMENT THAT NEUTRALIZES HUMAN RHINOVIRUS AND ANALYSIS OF THE FAB-VIRUS COMPLEX
Authors	:	Smith, T.J.; Liu, H.
Deposited on	:	1994-05-24
Resolution	:	2.75 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 (i) 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 (i)) were used in the production of this report:

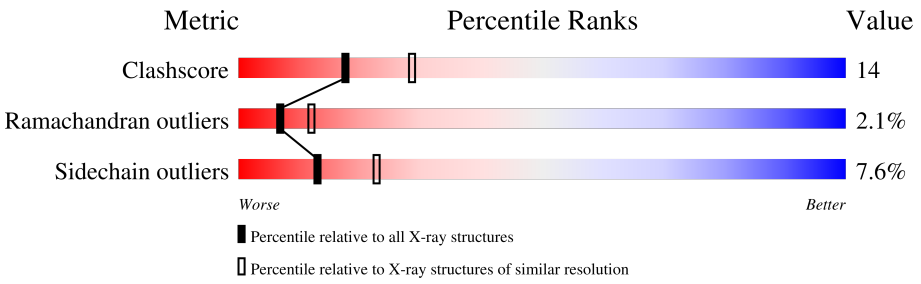
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36.2

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 2.75 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))
Clashscore	141614	1277 (2.78-2.74)
Ramachandran outliers	138981	1257 (2.78-2.74)
Sidechain outliers	138945	1257 (2.78-2.74)

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 <=5%

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	L	210	80% 16% ·
2	H	219	62% 35% ·

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 3416 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 IGG2A-KAPPA 17-IA FAB (LIGHT CHAIN).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	L	210	1619	1011	271	329	8	0	0	0

There are 21 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
L	14	PHE	SER	CONFLICT	EMBL X79906
L	15	PRO	LEU	CONFLICT	EMBL X79906
L	18	LYS	ARG	CONFLICT	EMBL X79906
L	21	ILE	MET	CONFLICT	EMBL X79906
L	24	SER	THR	CONFLICT	EMBL X79906
L	26	THR	SER	CONFLICT	EMBL X79906
L	?	-	SER	DELETION	EMBL X79906
L	?	-	SER	DELETION	EMBL X79906
L	30	ASN	SER	CONFLICT	EMBL X79906
L	32	MET	LEU	CONFLICT	EMBL X79906
L	35	PHE	TYR	CONFLICT	EMBL X79906
L	41	THR	SER	CONFLICT	EMBL X79906
L	50	SER	THR	CONFLICT	EMBL X79906
L	76	ARG	SER	CONFLICT	EMBL X79906
L	88	GLN	HIS	CONFLICT	EMBL X79906
L	90	ARG	TYR	CONFLICT	EMBL X79906
L	91	SER	HIS	CONFLICT	EMBL X79906
L	92	SER	ARG	CONFLICT	EMBL X79906
L	93	TYR	PHE	CONFLICT	EMBL X79906
L	95	ILE	HIS	CONFLICT	EMBL X79906
L	99	SER	GLY	CONFLICT	EMBL X79906

- Molecule 2 is a protein called IGG2A-KAPPA 17-IA FAB (HEAVY CHAIN).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	H	219	1640	1037	271	325	7	0	0	0

There are 28 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
H	2	GLY	ILE	CONFLICT	PIR S38950
H	9	ALA	PRO	CONFLICT	PIR S38950
H	16	SER	ALA	CONFLICT	PIR S38950
H	28	ALA	THR	CONFLICT	PIR S38950
H	30	SER	THR	CONFLICT	PIR S38950
H	31	SER	ASP	CONFLICT	PIR S38950
H	32	PHE	TYR	CONFLICT	PIR S38950
H	33	TRP	TYR	CONFLICT	PIR S38950
H	34	VAL	ILE	CONFLICT	PIR S38950
H	35	ASN	HIS	CONFLICT	PIR S38950
H	43	GLN	GLU	CONFLICT	PIR S38950
H	50	GLN	TRP	CONFLICT	PIR S38950
H	55	ASP	SER	CONFLICT	PIR S38950
H	57	ASP	ASN	CONFLICT	PIR S38950
H	58	ASN	THR	CONFLICT	PIR S38950
H	62	GLY	GLU	CONFLICT	PIR S38950
H	72	ALA	VAL	CONFLICT	PIR S38950
H	74	LYS	THR	CONFLICT	PIR S38950
H	77	THR	SER	CONFLICT	PIR S38950
H	84	TYR	SER	CONFLICT	PIR S38950
H	99	SER	GLY	CONFLICT	PIR S38950
H	101	ASN	-	INSERTION	PIR S38950
H	102	TYR	-	INSERTION	PIR S38950
H	103	PRO	LYS	CONFLICT	PIR S38950
H	104	TYR	PHE	CONFLICT	PIR S38950
H	136	GLY	ASP	CONFLICT	PIR S38950
H	179	GLY	ASP	CONFLICT	PIR S38950
H	198	THR	SER	CONFLICT	PIR S38950

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
3	L	75	75	75	0	0
3	H	82	82	82	0	0

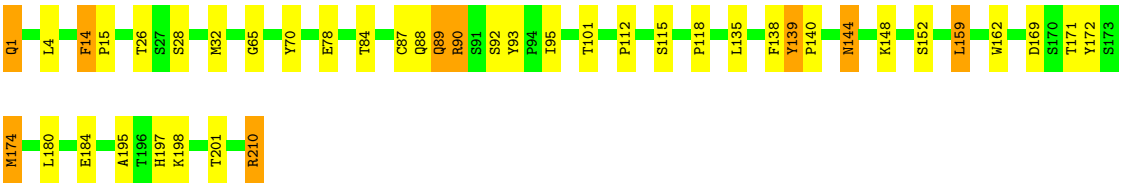
3 Residue-property plots (i)

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.

Note EDS was not executed.

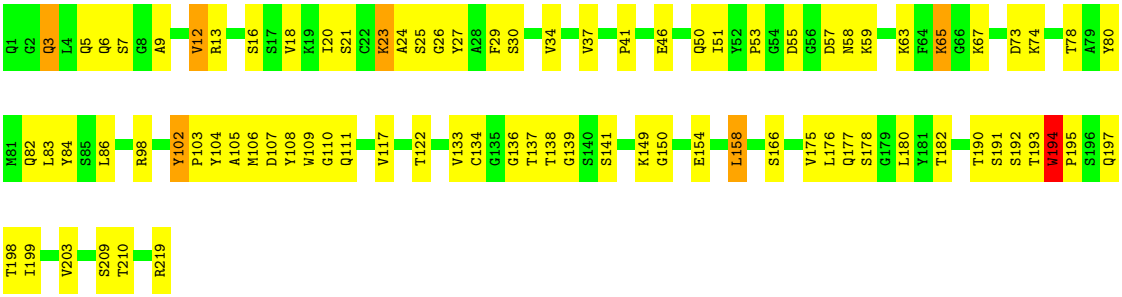
• Molecule 1: IGG2A-KAPPA 17-IA FAB (LIGHT CHAIN)

Chain L: 80% 16% •



• Molecule 2: IGG2A-KAPPA 17-IA FAB (HEAVY CHAIN)

Chain H: 62% 35% •



4 Data and refinement statistics (i)

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	37.80Å 97.30Å 129.50Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	6.00 – 2.75	Depositor
% Data completeness (in resolution range)	(Not available) (6.00-2.75)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	PROLSQ, X-PLOR	Depositor
R, R_{free}	0.174 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	3416	wwPDB-VP
Average B, all atoms ($Å^2$)	19.0	wwPDB-VP

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	L	0.39	0/1658	0.67	0/2251
2	H	0.43	0/1684	0.73	2/2296 (0.1%)
All	All	0.41	0/3342	0.70	2/4547 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	H	150	GLY	N-CA-C	5.29	126.33	113.10
2	H	194	TRP	N-CA-C	5.01	124.54	111.00

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	L	1619	0	1557	32	0
2	H	1640	0	1593	63	0
3	H	82	0	0	10	0
3	L	75	0	0	2	0
All	All	3416	0	3150	88	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 14.

All (88) 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:H:51:ILE:HG22	2:H:58:ASN:HB3	1.52	0.90
2:H:154:GLU:HG2	3:H:360:HOH:O	1.82	0.78
2:H:30:SER:HA	2:H:53:PRO:HG2	1.65	0.76
2:H:37:VAL:HG11	2:H:109:TRP:HZ3	1.54	0.73
1:L:135:LEU:HD23	1:L:174:MET:HG2	1.71	0.71
1:L:88:GLN:HE22	1:L:90:ARG:HB3	1.56	0.70
1:L:201:THR:HG23	3:L:405:HOH:O	1.93	0.67
2:H:137:THR:HB	3:H:404:HOH:O	1.92	0.67
1:L:159:LEU:HD11	2:H:175:VAL:HB	1.77	0.65
1:L:88:GLN:NE2	1:L:90:ARG:HB3	2.12	0.63
1:L:14:PHE:HD1	1:L:15:PRO:HD2	1.67	0.60
2:H:102:TYR:HB3	2:H:103:PRO:HD3	1.84	0.60
2:H:12:VAL:HG11	2:H:18:VAL:HG13	1.85	0.58
1:L:118:PRO:HG2	2:H:219:ARG:CZ	2.33	0.58
2:H:158:LEU:HD22	2:H:203:VAL:HG22	1.85	0.57
2:H:30:SER:OG	2:H:74:LYS:HE3	2.04	0.57
1:L:32:MET:CE	1:L:87:CYS:HB2	2.35	0.57
2:H:6:GLN:H	2:H:111:GLN:HE22	1.53	0.57
1:L:140:PRO:HG2	1:L:198:LYS:HD3	1.87	0.56
1:L:139:TYR:HB3	1:L:140:PRO:HD3	1.87	0.56
2:H:105:ALA:HA	3:H:309:HOH:O	2.06	0.55
2:H:3:GLN:HB3	2:H:25:SER:HB2	1.89	0.55
2:H:133:VAL:HG13	2:H:133:VAL:O	2.07	0.55
2:H:158:LEU:CD2	2:H:203:VAL:HG22	2.37	0.54
2:H:55:ASP:OD2	2:H:57:ASP:HB2	2.08	0.54
1:L:112:PRO:HB3	1:L:138:PHE:HB3	1.90	0.54
1:L:89:GLN:O	1:L:95:ILE:HG23	2.08	0.53
1:L:210:ARG:HH11	1:L:210:ARG:HB3	1.74	0.53
2:H:194:TRP:HB3	2:H:195:PRO:HD3	1.90	0.53
2:H:3:GLN:HG3	2:H:5:GLN:HE22	1.73	0.53
1:L:32:MET:HE2	1:L:87:CYS:HB2	1.91	0.52
2:H:18:VAL:O	2:H:82:GLN:HG3	2.09	0.52
1:L:1:GLN:HA	1:L:1:GLN:OE1	2.09	0.52
2:H:198:THR:C	2:H:199:ILE:HD12	2.29	0.52
2:H:37:VAL:HG23	2:H:46:GLU:O	2.10	0.51
2:H:27:TYR:CZ	2:H:98:ARG:HD3	2.44	0.51
1:L:139:TYR:O	1:L:140:PRO:C	2.48	0.51
2:H:37:VAL:HG11	2:H:109:TRP:CZ3	2.41	0.51
2:H:138:THR:HG22	2:H:139:GLY:H	1.76	0.50
2:H:176:LEU:HD12	2:H:180:LEU:O	2.12	0.50
1:L:115:SER:HA	2:H:136:GLY:O	2.12	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:L:140:PRO:HD2	1:L:197:HIS:HE1	1.78	0.48
2:H:98:ARG:O	2:H:106:MET:HA	2.13	0.48
1:L:159:LEU:HD21	2:H:175:VAL:HG11	1.96	0.48
2:H:23:LYS:N	2:H:23:LYS:HD3	2.29	0.48
2:H:9:ALA:HB1	3:H:366:HOH:O	2.13	0.47
2:H:141:SER:HB3	2:H:191:SER:N	2.29	0.47
2:H:193:THR:HG23	2:H:197:GLN:OE1	2.15	0.46
2:H:195:PRO:HA	3:H:826:HOH:O	2.15	0.46
2:H:37:VAL:CG1	2:H:109:TRP:HZ3	2.25	0.46
2:H:34:VAL:O	2:H:50:GLN:HA	2.16	0.46
2:H:149:LYS:HG2	2:H:182:THR:HG23	1.96	0.46
1:L:144:ASN:O	1:L:195:ALA:HA	2.15	0.45
2:H:73:ASP:HB3	2:H:78:THR:OG1	2.16	0.45
2:H:30:SER:HA	2:H:53:PRO:CG	2.42	0.45
1:L:162:TRP:N	1:L:162:TRP:CD1	2.85	0.45
2:H:21:SER:HB3	2:H:80:TYR:CE1	2.51	0.45
1:L:139:TYR:O	1:L:172:TYR:HD2	2.00	0.44
2:H:138:THR:HG22	2:H:139:GLY:N	2.33	0.44
1:L:90:ARG:CZ	2:H:104:TYR:CD2	3.01	0.44
2:H:65:LYS:HA	2:H:65:LYS:CE	2.47	0.44
2:H:177:GLN:HB3	3:H:869:HOH:O	2.17	0.44
2:H:102:TYR:O	2:H:103:PRO:C	2.56	0.43
2:H:6:GLN:H	2:H:111:GLN:NE2	2.17	0.43
2:H:12:VAL:O	2:H:117:VAL:HA	2.18	0.43
2:H:177:GLN:N	2:H:180:LEU:O	2.52	0.43
2:H:55:ASP:HA	3:H:400:HOH:O	2.18	0.43
1:L:1:GLN:HB2	3:L:372:HOH:O	2.19	0.43
1:L:148:LYS:HA	1:L:152:SER:O	2.19	0.43
1:L:65:GLY:HA3	1:L:70:TYR:HA	2.01	0.42
2:H:67:LYS:HD3	2:H:84:TYR:O	2.19	0.42
2:H:6:GLN:HE21	2:H:110:GLY:HA3	1.85	0.42
2:H:12:VAL:HG21	2:H:86:LEU:HD12	2.02	0.42
2:H:59:LYS:HD3	3:H:930:HOH:O	2.18	0.42
2:H:13:ARG:NH2	3:H:313:HOH:O	2.53	0.42
2:H:24:ALA:HB2	2:H:29:PHE:HD1	1.85	0.41
2:H:176:LEU:HA	2:H:180:LEU:O	2.19	0.41
1:L:4:LEU:HD11	1:L:89:GLN:CB	2.51	0.41
1:L:92:SER:HB3	1:L:93:TYR:H	1.70	0.41
2:H:149:LYS:HE2	2:H:149:LYS:HB3	1.72	0.41
1:L:169:ASP:OD1	1:L:171:THR:HG22	2.20	0.41
2:H:193:THR:O	2:H:197:GLN:HB2	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:L:118:PRO:HG2	2:H:219:ARG:NH2	2.35	0.41
1:L:84:THR:HA	1:L:101:THR:O	2.20	0.40
2:H:83:LEU:CB	2:H:86:LEU:HD21	2.51	0.40
2:H:177:GLN:N	3:H:869:HOH:O	2.54	0.40
1:L:159:LEU:HD21	2:H:175:VAL:CG1	2.51	0.40
2:H:12:VAL:HG21	2:H:86:LEU:CD1	2.52	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 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	L	208/210 (99%)	196 (94%)	11 (5%)	1 (0%)	29 47
2	H	217/219 (99%)	188 (87%)	21 (10%)	8 (4%)	3 4
All	All	425/429 (99%)	384 (90%)	32 (8%)	9 (2%)	7 12

All (9) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	H	102	TYR
2	H	194	TRP
2	H	134	CYS
1	L	139	TYR
2	H	3	GLN
2	H	16	SER
2	H	178	SER
2	H	209	SER
2	H	26	GLY

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	L	185/185 (100%)	172 (93%)	13 (7%)	15 26
2	H	182/182 (100%)	167 (92%)	15 (8%)	11 20
All	All	367/367 (100%)	339 (92%)	28 (8%)	13 23

All (28) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	L	1	GLN
1	L	14	PHE
1	L	26	THR
1	L	28	SER
1	L	78	GLU
1	L	89	GLN
1	L	90	ARG
1	L	144	ASN
1	L	159	LEU
1	L	174	MET
1	L	180	LEU
1	L	184	GLU
1	L	210	ARG
2	H	7	SER
2	H	12	VAL
2	H	20	ILE
2	H	23	LYS
2	H	41	PRO
2	H	63	LYS
2	H	65	LYS
2	H	107	ASP
2	H	108	TYR
2	H	122	THR
2	H	158	LEU
2	H	166	SER
2	H	190	THR
2	H	192	SER

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Mol	Chain	Res	Type
2	H	210	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	L	33	HIS
1	L	88	GLN
1	L	136	ASN
1	L	144	ASN
1	L	160	ASN
1	L	189	ASN
2	H	5	GLN
2	H	6	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 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)

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates (i)

EDS was not executed - this section is therefore empty.

6.4 Ligands (i)

EDS was not executed - this section is therefore empty.

6.5 Other polymers (i)

EDS was not executed - this section is therefore empty.