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P R O T E I N   D A T A   B A N K

wwPDB X-ray Structure Validation Summary Report (i)

May 29, 2024 – 02:54 PM EDT

PDB ID	:	2VIR
Title	:	INFLUENZA VIRUS HEMAGGLUTININ COMPLEXED WITH A NEU-TRALIZING ANTIBODY
Authors	:	Bizebard, T.; Fleury, D.; Gigant, B.; Wharton, S.A.; Skehel, J.J.; Knossow, M.
Deposited on	:	1997-12-22
Resolution	:	3.25 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 (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:

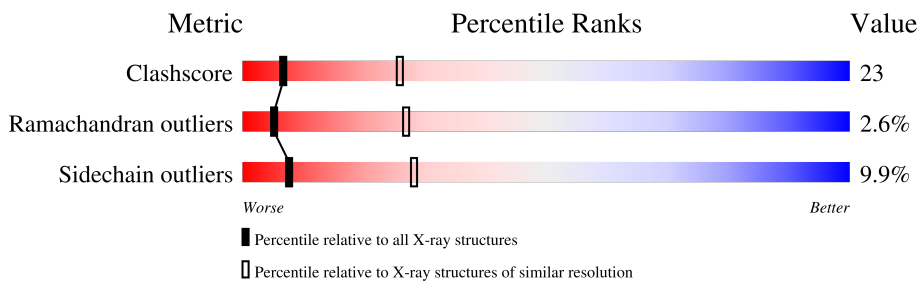|		
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	: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

1 Overall quality at a glance ⓘ

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

The reported resolution of this entry is 3.25 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	Percentile Ranks	Value
Clashscore		23
Ramachandran outliers		2.6%
Sidechain outliers		9.9%

Worse — *Better*

■ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	141614	1251 (3.30-3.22)
Ramachandran outliers	138981	1229 (3.30-3.22)
Sidechain outliers	138945	1228 (3.30-3.22)

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	A	210	59% 33% 8%
2	B	221	57% 39% •
3	C	282	43% 46% 5% 5%

2 Entry composition ⓘ

There are 4 unique types of molecules in this entry. The entry contains 5339 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 IMMUNOGLOBULIN (IGG1, LAMBDA).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	210	Total	C	N	O	S	0	0	0
			1589	994	266	323	6			

- Molecule 2 is a protein called IMMUNOGLOBULIN (IGG1, LAMBDA).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	221	Total	C	N	O	S	0	0	0
			1672	1065	270	328	9			

There are 23 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	3	GLN	LYS	conflict	GB 4096752
B	5	LYS	GLN	conflict	GB 4096752
B	28	LEU	SER	conflict	GB 4096752
B	30	ILE	THR	conflict	GB 4096752
B	32	ASN	TYR	conflict	GB 4096752
B	63	LEU	HIS	conflict	GB 4096752
B	69	ILE	PHE	conflict	GB 4096752
B	83	LYS	ASN	conflict	GB 4096752
B	92	MET	LEU	conflict	GB 4096752
B	98	ASP	-	insertion	GB 4096752
B	99	PHE	-	insertion	GB 4096752
B	100	TYR	-	insertion	GB 4096752
B	102	TYR	HIS	conflict	GB 4096752
B	103	ASP	GLY	conflict	GB 4096752
B	105	PHE	-	insertion	GB 4096752
B	106	TYR	-	insertion	GB 4096752
B	107	TYR	-	insertion	GB 4096752
B	108	ALA	-	insertion	GB 4096752
B	109	MET	-	insertion	GB 4096752
B	110	ASP	-	insertion	GB 4096752

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Chain	Residue	Modelled	Actual	Comment	Reference
B	117	SER	LEU	conflict	GB 4096752
B	122	SER	ALA	conflict	GB 4096752
B	135	PRO	SER	conflict	GB 4096752

- Molecule 3 is a protein called HEMAGGLUTININ.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	267	Total 2075	C 1304	N 360	O 400	S 11	0	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	38	ASP	ASN	conflict	UNP P03437
C	81	ASP	ASN	modified residue	UNP P03437
C	165	ASP	ASN	modified residue	UNP P03437
C	285	ASP	ASN	modified residue	UNP P03437

- Molecule 4 is ZINC ION (three-letter code: ZN) (formula: Zn).

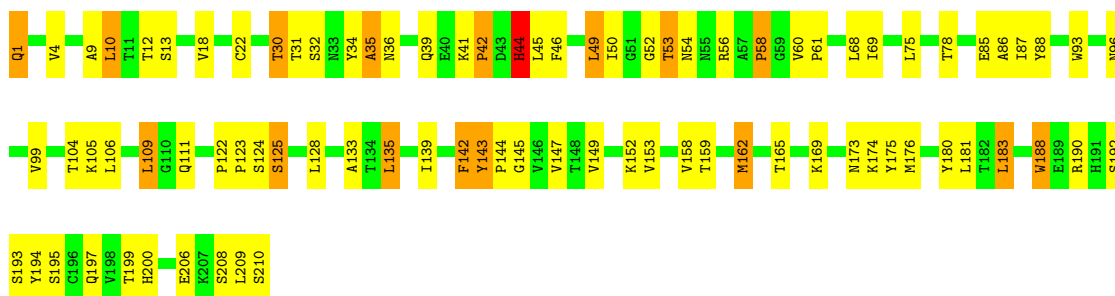| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	2	Total 2	Zn 2	0	0
4	C	1	Total 1	Zn 1	0	0

3 Residue-property plots ⓘ

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.
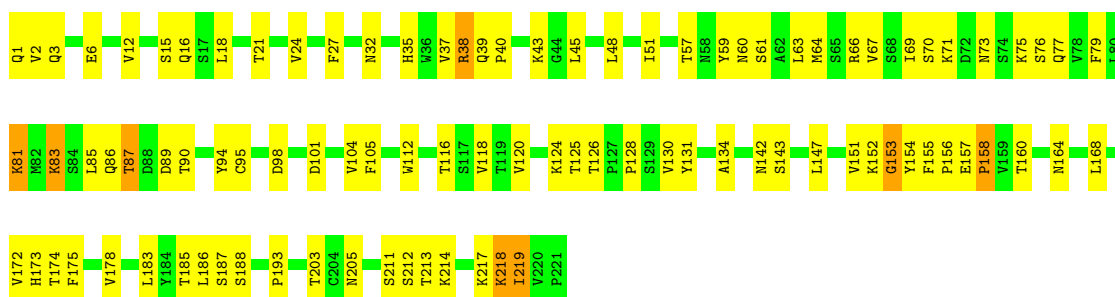
Note EDS was not executed.

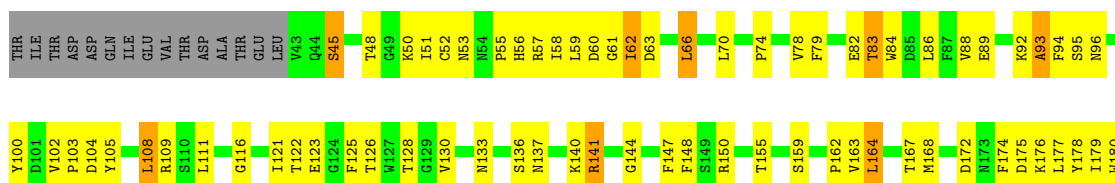• Molecule 1: IMMUNOGLOBULIN (IGG1, LAMBDA)

Chain A:
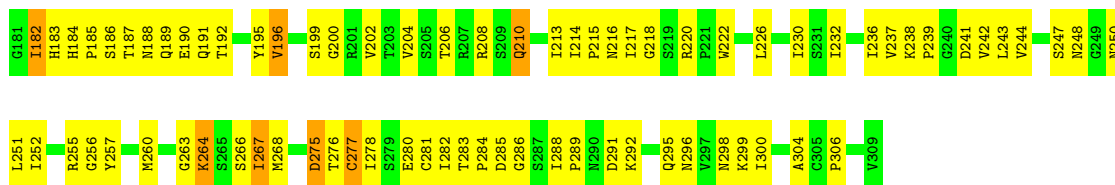

• Molecule 2: IMMUNOGLOBULIN (IGG1, LAMBDA)

Chain B:

• Molecule 3: HEMAGGLUTININ

Chain C:

G181 I182 H183 H184 P185 S186 T187 N188 Q189 E190 Q191 T192 Y195 V196 S199 G200 R201 V202 T203 V204 S205 T206 R207 R208 S209 Q210 I213 I214 P215 N216 I217 G218 S219 R220 P221 W222 L226 I230 S231 I232 I236 V237 K238 P239 G240 D241 V242 L243 V244 S247 N248 G249 N250

L251 I252 R255 G256 Y257 M260 G263 K264 S265 S266 I267 M268 D275 T276 C277 I278 S279 E280 C281 I282 T283 P284 D285 G286 S287 I288 P289 N290 D291 K292 Q295 N296 V297 N298 K299 I300 A304 C305 P306 V309

4 Data and refinement statistics (i)

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

Property	Value	Source
Space group	P 61 2 2	Depositor
Cell constants a, b, c, α, β, γ	85.50Å 85.50Å 515.00Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	7.00 – 3.25	Depositor
% Data completeness (in resolution range)	(Not available) (7.00-3.25)	Depositor
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	X-PLOR 3.84	Depositor
R, R_{free}	0.198 , 0.249	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	5339	wwPDB-VP
Average B, all atoms (Å^2)	28.0	wwPDB-VP

5   Model quality ⓘ

5.1   Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: ZN

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	0.61	0/1627	0.87	2/2224 (0.1%)
2	B	0.59	0/1718	0.83	1/2351 (0.0%)
3	C	0.61	0/2127	0.84	1/2896 (0.0%)
All	All	0.60	0/5472	0.85	4/7471 (0.1%)

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	0	1

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	45	LEU	CA-CB-CG	6.62	130.53	115.30
2	B	153	GLY	N-CA-C	5.72	127.40	113.10
3	C	108	LEU	CA-CB-CG	5.16	127.16	115.30
1	A	45	LEU	N-CA-C	-5.01	97.48	111.00

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	143	TYR	Sidechain

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	1589	0	1532	70	0
2	B	1672	0	1635	75	0
3	C	2075	0	2011	108	0
4	A	2	0	0	0	0
4	C	1	0	0	0	0
All	All	5339	0	5178	247	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 23.

The worst 5 of 247 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:134:ALA:HB2	2:B:219:ILE:HD11	1.40	1.03
1:A:147:VAL:HG12	1:A:200:HIS:HB2	1.47	0.97
3:C:283:THR:HG23	3:C:285:ASP:H	1.33	0.93
2:B:40:PRO:HG2	2:B:43:LYS:HB2	1.51	0.91
3:C:45:SER:HB3	3:C:296:ASN:OD1	1.81	0.81

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	208/210 (99%)	183 (88%)	19 (9%)	6 (3%)	4	25

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	B	219/221 (99%)	189 (86%)	26 (12%)	4 (2%)	8	35
3	C	265/282 (94%)	232 (88%)	25 (9%)	8 (3%)	4	24
All	All	692/713 (97%)	604 (87%)	70 (10%)	18 (3%)	5	27

5 of 18 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	87	THR
2	B	173	HIS
2	B	212	SER
3	C	210	GLN
2	B	153	GLY

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 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	178/178 (100%)	158 (89%)	20 (11%)	6	23
2	B	192/192 (100%)	180 (94%)	12 (6%)	18	47
3	C	236/250 (94%)	208 (88%)	28 (12%)	5	20
All	All	606/620 (98%)	546 (90%)	60 (10%)	8	28

5 of 60 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	185	THR
3	C	264	LYS
3	C	57	ARG
3	C	255	ARG
3	C	278	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 11 such sidechains are listed below:

Mol	Chain	Res	Type
3	C	189	GLN
3	C	210	GLN
3	C	298	ASN
3	C	216	ASN
2	B	32	ASN

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 monosaccharides in this entry.

5.6   Ligand geometry ⓘ

Of 3 ligands modelled in this entry, 3 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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 ⓘ

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates ⓘ

EDS was not executed - this section is therefore empty.

6.4 Ligands ⓘ

EDS was not executed - this section is therefore empty.

6.5 Other polymers ⓘ

EDS was not executed - this section is therefore empty.