wwPDB X-ray Structure Validation Summary Report (i)

Jan 31, 2016 – 08:02 PM GMT

PDB ID	:	1IGI
Title	:	26-10 FAB:DIGOXIN COMPLEX-AFFINITY AND SPECIFICITY DUE TO SURFACE COMPLEMENTARITY
Authors	:	Jeffrey, P.D.; Sheriff, S.
Deposited on	:	1993-02-19
Resolution	:	2.70 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
http://wwpdb.org/validation/2016/XrayValidationReportHelp
with specific help available everywhere you see the (i) symbol.

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

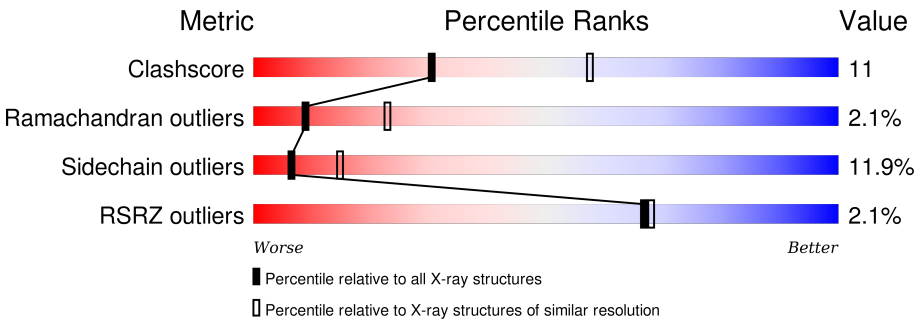
MolProbity	:	4.02b-467
Mogul	:	1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix)	:	1.9-1692
EDS	:	rb-20026688
Percentile statistics	:	20151230.v01 (using entries in the PDB archive December 30th 2015)
Refmac	:	5.8.0135
CCP4	:	6.5.0
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	trunk26865

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 2.70 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)	Similar resolution (#Entries, resolution range(Å))
Clashscore	102246	2422 (2.70-2.70)
Ramachandran outliers	100387	2382 (2.70-2.70)
Sidechain outliers	100360	2382 (2.70-2.70)
RSRZ outliers	91569	2107 (2.70-2.70)

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. 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	L	219	61% 32% 6%
2	H	218	4% 65% 29% 5%

2 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 3298 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 26-10 FAB (LIGHT CHAIN).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	L	218	1676	1046	286	338	6	0	0	0

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
L	7	THR	SER	CONFLICT	PIR S52028
L	27B	LEU	ILE	CONFLICT	PIR S52028
L	34	ASN	GLU	CONFLICT	PIR S52028
L	40	ALA	PRO	CONFLICT	PIR S52028
L	85	ILE	VAL	CONFLICT	PIR S52028
L	87	PHE	TYR	CONFLICT	PIR S52028
L	89	SER	PHE	CONFLICT	PIR S52028
L	91	THR	GLY	CONFLICT	PIR S52028
L	92	THR	SER	CONFLICT	PIR S52028
L	103	LYS	ASN	CONFLICT	PIR S52028

- Molecule 2 is a protein called IGG2A-KAPPA 26-10 FAB (HEAVY CHAIN).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	H	217	1622	1024	264	325	9	0	0	0

There are 32 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
H	13	LYS	ARG	CONFLICT	PIR S38950
H	19	ARG	LYS	CONFLICT	PIR S38950
H	20	MET	ILE	CONFLICT	PIR S38950
H	24	SER	ALA	CONFLICT	PIR S38950
H	28	ILE	THR	CONFLICT	PIR S38950
H	32	PHE	TYR	CONFLICT	PIR S38950

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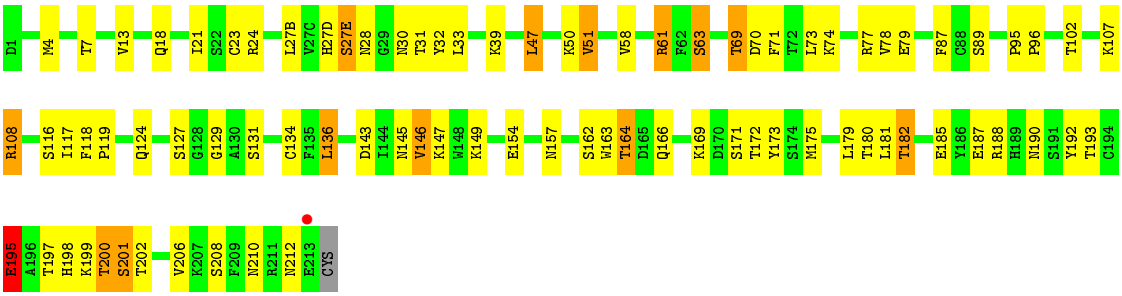
Chain	Residue	Modelled	Actual	Comment	Reference
H	34	MET	ILE	CONFLICT	PIR S38950
H	35	ASN	HIS	CONFLICT	PIR S38950
H	38	ARG	LYS	CONFLICT	PIR S38950
H	40	SER	ARG	CONFLICT	PIR S38950
H	41	HIS	PRO	CONFLICT	PIR S38950
H	43	LYS	GLU	CONFLICT	PIR S38950
H	44	SER	GLY	CONFLICT	PIR S38950
H	46	ASP	GLU	CONFLICT	PIR S38950
H	47	TYR	TRP	CONFLICT	PIR S38950
H	50	TYR	TRP	CONFLICT	PIR S38950
H	52	SER	TYR	CONFLICT	PIR S38950
H	53	TYR	GLY	CONFLICT	PIR S38950
H	56	VAL	ASN	CONFLICT	PIR S38950
H	58	GLY	LYS	CONFLICT	PIR S38950
H	61	GLN	GLU	CONFLICT	PIR S38950
H	73	LYS	THR	CONFLICT	PIR S38950
H	81	GLU	GLN	CONFLICT	PIR S38950
H	82A	ARG	SER	CONFLICT	PIR S38950
H	91	TYR	PHE	CONFLICT	PIR S38950
H	94	GLY	-	INSERTION	PIR S38950
H	95	SER	-	INSERTION	PIR S38950
H	96	SER	ARG	CONFLICT	PIR S38950
H	98	ASN	GLY	CONFLICT	PIR S38950
H	100	TRP	PHE	CONFLICT	PIR S38950
H	105	HIS	GLN	CONFLICT	PIR S38950
H	107	ALA	THR	CONFLICT	PIR S38950

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 errors 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.

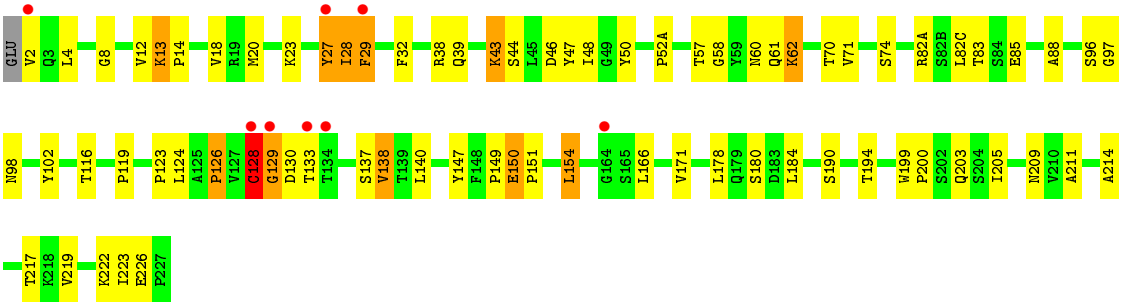
- Molecule 1: IGG2A-KAPPA 26-10 FAB (LIGHT CHAIN)

Chain L:



- Molecule 2: IGG2A-KAPPA 26-10 FAB (HEAVY CHAIN)

Chain H:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	43.78Å 89.25Å 59.24Å 90.00° 95.94° 90.00°	Depositor
Resolution (Å)	8.00 – 2.70 31.17 – 2.73	Depositor EDS
% Data completeness (in resolution range)	(Not available) (8.00-2.70) 65.3 (31.17-2.73)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.81 (at 2.72Å)	Xtriage
Refinement program	X-PLOR	Depositor
R, R_{free}	0.177 , (Not available) 0.173 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	DCC
Wilson B-factor (Å^2)	32.7	Xtriage
Anisotropy	0.503	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.38 , 120.0	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.32$	Xtriage
Outliers	0 of 7998 reflections	Xtriage
F_o,F_c correlation	0.92	EDS
Total number of atoms	3298	wwPDB-VP
Average B, all atoms (Å^2)	16.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.26% 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, 0.375 respectively for untwinned datasets, and 0.333, 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	L	0.71	0/1713	1.54	17/2326 (0.7%)
2	H	0.71	0/1664	1.62	17/2268 (0.7%)
All	All	0.71	0/3377	1.58	34/4594 (0.7%)

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
2	H	0	1

There are no bond length outliers.

The worst 5 of 34 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	H	150	GLU	N-CA-CB	-8.38	95.51	110.60
2	H	29	PHE	CA-C-N	-7.70	100.26	117.20
2	H	28	ILE	CA-C-N	-7.43	100.84	117.20
1	L	180	THR	CA-CB-CG2	-6.79	102.90	112.40
2	H	150	GLU	CB-CA-C	6.66	123.73	110.40

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	H	8	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	L	1676	0	1621	39	0
2	H	1622	0	1566	38	0
All	All	3298	0	3187	71	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 11.

The worst 5 of 71 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:12:VAL:HG21	2:H:82(C):LEU:HD13	1.61	0.82
2:H:38:ARG:HB2	2:H:48:ILE:HD11	1.72	0.72
2:H:119:PRO:HB3	2:H:147:TYR:HB3	1.72	0.71
1:L:47:LEU:HA	1:L:58:VAL:HG21	1.79	0.64
1:L:21:ILE:HG12	1:L:102:THR:HG21	1.80	0.63

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	216/219 (99%)	200 (93%)	13 (6%)	3 (1%)	14 35
2	H	215/218 (99%)	187 (87%)	22 (10%)	6 (3%)	6 15
All	All	431/437 (99%)	387 (90%)	35 (8%)	9 (2%)	9 23

5 of 9 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	L	212	ASN
2	H	98	ASN
2	H	128	CYS
2	H	133	THR
2	H	97	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	193/196 (98%)	171 (89%)	22 (11%)	7 16
2	H	184/187 (98%)	161 (88%)	23 (12%)	6 13
All	All	377/383 (98%)	332 (88%)	45 (12%)	6 15

5 of 45 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	L	202	THR
2	H	43	LYS
2	H	194	THR
2	H	13	LYS
2	H	44	SER

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	L	18	GLN
1	L	30	ASN
1	L	124	GLN
1	L	138	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.

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	L	218/219 (99%)	-0.50	1 (0%)	91	93	2, 13, 28, 34	0
2	H	217/218 (99%)	-0.16	8 (3%)	45	45	3, 19, 44, 60	0
All	All	435/437 (99%)	-0.33	9 (2%)	67	68	2, 15, 35, 60	0

The worst 5 of 9 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	H	29	PHE	7.4
2	H	129	GLY	4.3
2	H	128	CYS	3.4
2	H	134	THR	3.1
2	H	133	THR	2.6

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 carbohydrates 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.