



wwPDB X-ray Structure Validation Summary Report i

Feb 27, 2014 – 08:31 AM GMT

PDB ID : 4B7I
Title : Crystal Structure of Human IgG Fc Bearing Hybrid-type Glycans
Authors : Bowden, T.A.; Baruah, K.; Coles, C.H.; Harvey, D.J.; Song, B.D.; Stuart, D.I.; Aricescu, A.R.; Scanlan, C.N.; Jones, E.Y.; Crispin, M.
Deposited on : 2012-08-20
Resolution : 2.36 Å (reported)

This is a wwPDB 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/ValidationPDFNotes.html>

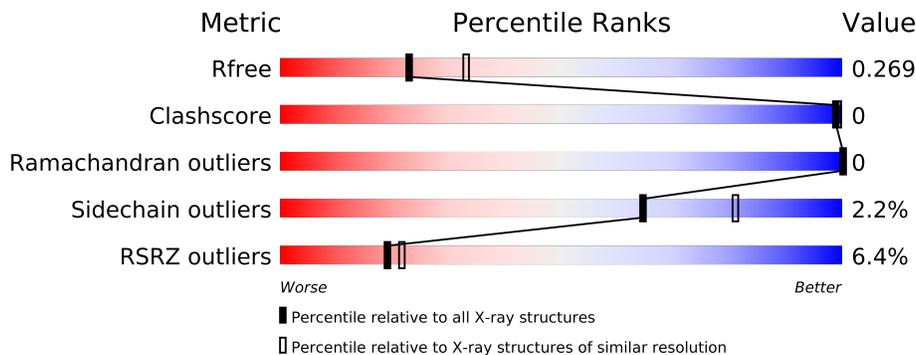
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.15 2013
Xtriage (Phenix) : dev-1323
EDS : stable22639
Percentile statistics : 21963
Refmac : 5.8.0049
CCP4 : 6.3.0 (Settle)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP) : stable22683

1 Overall quality at a glance

The reported resolution of this entry is 2.36 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}	66092	3327 (2.40-2.32)
Clashscore	79885	1064 (2.38-2.34)
Ramachandran outliers	78287	1048 (2.38-2.34)
Sidechain outliers	78261	1049 (2.38-2.34)
RSRZ outliers	66119	3330 (2.40-2.32)

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. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Mol	Chain	Length	Quality of chain
1	A	218	
1	B	218	

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 3495 atoms, of which 0 are hydrogen and 0 are deuterium.

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 IG GAMMA-1 CHAIN C REGION.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	208	1662	1058	280	318	6	0	0	0
1	B	190	1521	973	256	286	6	0	0	0

There are 18 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	447	THR	-	EXPRESSION TAG	UNP P01857
A	448	LYS	-	EXPRESSION TAG	UNP P01857
A	449	HIS	-	EXPRESSION TAG	UNP P01857
A	450	HIS	-	EXPRESSION TAG	UNP P01857
A	451	HIS	-	EXPRESSION TAG	UNP P01857
A	452	HIS	-	EXPRESSION TAG	UNP P01857
A	453	HIS	-	EXPRESSION TAG	UNP P01857
A	454	HIS	-	EXPRESSION TAG	UNP P01857
A	393	ALA	THR	CLONING ARTIFACT	UNP P01857
B	447	THR	-	EXPRESSION TAG	UNP P01857
B	448	LYS	-	EXPRESSION TAG	UNP P01857
B	449	HIS	-	EXPRESSION TAG	UNP P01857
B	450	HIS	-	EXPRESSION TAG	UNP P01857
B	451	HIS	-	EXPRESSION TAG	UNP P01857
B	452	HIS	-	EXPRESSION TAG	UNP P01857
B	453	HIS	-	EXPRESSION TAG	UNP P01857
B	454	HIS	-	EXPRESSION TAG	UNP P01857
B	393	ALA	THR	CLONING ARTIFACT	UNP P01857

- Molecule 2 is a polymer of unknown type called SUGAR (8-MER).

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
2	A	8	93	52	2	39	0	0

There are 9 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	447	THR	-	EXPRESSION TAG	UNP P01857
A	448	LYS	-	EXPRESSION TAG	UNP P01857
A	449	HIS	-	EXPRESSION TAG	UNP P01857
A	450	HIS	-	EXPRESSION TAG	UNP P01857
A	451	HIS	-	EXPRESSION TAG	UNP P01857
A	452	HIS	-	EXPRESSION TAG	UNP P01857
A	453	HIS	-	EXPRESSION TAG	UNP P01857
A	454	HIS	-	EXPRESSION TAG	UNP P01857
A	393	ALA	THR	CLONING ARTIFACT	UNP P01857

- Molecule 3 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	B	1	Total Cl 1 1	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	147	Total O 147 147	0	0
4	B	71	Total O 71 71	0	0

3 Residue-property plots

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.

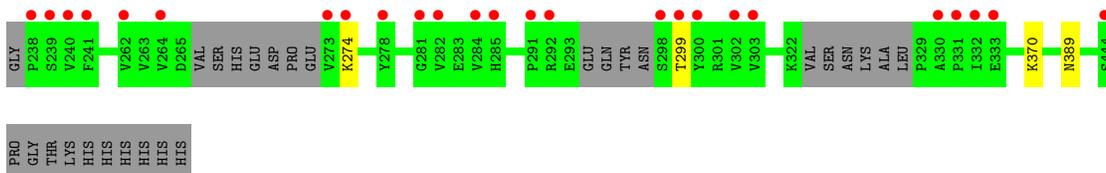
- Molecule 1: IG GAMMA-1 CHAIN C REGION

Chain A: 



- Molecule 1: IG GAMMA-1 CHAIN C REGION

Chain B: 



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	49.04Å 72.99Å 140.83Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	39.51 – 2.36 39.48 – 2.36	Depositor EDS
% Data completeness (in resolution range)	99.3 (39.51-2.36) 99.1 (39.48-2.36)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.66 (at 2.37Å)	Xtrriage
Refinement program	REFMAC 5.7.0029	Depositor
R, R_{free}	0.215 , 0.266 0.216 , 0.269	Depositor DCC
R_{free} test set	1084 reflections (5.34%)	DCC
Wilson B-factor (Å ²)	33.3	Xtrriage
Anisotropy	0.768	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 30.8	EDS
Estimated twinning fraction	No twinning to report.	Xtrriage
L-test for twinning	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtrriage
Outliers	1 of 21398 reflections (0.005%)	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	3495	wwPDB-VP
Average B, all atoms (Å ²)	43.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 38.62 % of the origin peak, indicating pseudo translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo translational symmetry is equal to 3.5897e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

¹Intensities estimated from amplitudes.

5 Model quality (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: FUC, MAN, BMA, NAG, CL

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	0.37	0/1708	0.58	0/2327
1	B	0.36	0/1561	0.55	0/2120
All	All	0.36	0/3269	0.56	0/4447

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1662	0	0	1	0
1	B	1521	0	0	0	0
2	A	93	0	79	0	0
3	B	1	0	0	0	0
4	A	147	0	0	1	0
4	B	71	0	0	0	0
All	All	3495	0	79	1	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 0.

All (1) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:344:ARG:NH1	4:A:2072:HOH:O	2.44	0.50

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	206/218 (94%)	204 (99%)	2 (1%)	0	100	100
1	B	182/218 (84%)	179 (98%)	3 (2%)	0	100	100
All	All	388/436 (89%)	383 (99%)	5 (1%)	0	100	100

There are no Ramachandran outliers to report.

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	193/202 (96%)	189 (98%)	4 (2%)	66	82
1	B	177/202 (88%)	173 (98%)	4 (2%)	63	79
All	All	370/404 (92%)	362 (98%)	8 (2%)	64	81

5 of 8 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	370	LYS
1	B	389	ASN
1	B	299	THR

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Mol	Chain	Res	Type
1	A	365	LEU
1	B	274	LYS

Some 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 chains 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](#)

8 carbohydrates are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the chemical component dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# $ Z > 2$	Counts	RMSZ	# $ Z > 2$
2	NAG	A	1445	1,2	12,14,15	0.66	0	15,19,21	1.44	4 (26%)
2	NAG	A	1446	2	12,14,15	0.65	0	15,19,21	1.03	0
2	BMA	A	1447	2	10,11,12	0.53	0	11,15,17	0.87	1 (9%)
2	MAN	A	1448	2	10,11,12	0.60	0	11,15,17	1.05	0
2	MAN	A	1449	2	10,11,12	0.70	0	11,15,17	0.76	0
2	MAN	A	1450	2	10,11,12	0.75	0	11,15,17	0.69	0
2	FUC	A	1451	2	9,10,11	0.83	0	10,14,16	0.91	1 (10%)
2	MAN	A	1452	2	10,11,12	0.75	0	11,15,17	0.88	1 (9%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the chemical component dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means

no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	A	1445	1,2	-	0/6/23/26	0/1/1/1
2	NAG	A	1446	2	-	0/6/23/26	0/1/1/1
2	BMA	A	1447	2	-	0/2/19/22	0/1/1/1
2	MAN	A	1448	2	-	0/2/19/22	0/1/1/1
2	MAN	A	1449	2	-	0/2/19/22	0/1/1/1
2	MAN	A	1450	2	-	0/2/19/22	0/1/1/1
2	FUC	A	1451	2	-	0/0/17/20	0/1/1/1
2	MAN	A	1452	2	-	0/2/19/22	0/1/1/1

There are no bond length outliers.

The worst 5 of 7 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	1445	NAG	C8-C7-N2	3.12	122.20	116.11
2	A	1445	NAG	O5-C5-C6	2.79	109.90	106.98
2	A	1451	FUC	O5-C5-C4	-2.32	106.73	110.22
2	A	1445	NAG	C2-N2-C7	2.23	126.83	123.09
2	A	1452	MAN	O5-C5-C6	2.19	109.28	106.98

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

5.6 Ligand geometry

Of 1 ligands modelled in this entry, 1 is 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.

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 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	208/218 (95%)	-0.07	1 (0%) 88 91	24, 34, 54, 66	0
1	B	190/218 (87%)	0.46	25 (13%) 4 5	25, 41, 98, 117	0
All	All	398/436 (91%)	0.19	26 (6%) 19 21	24, 36, 90, 117	0

The worst 5 of 26 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	300	TYR	8.8
1	B	273	VAL	6.7
1	B	331	PRO	6.0
1	B	239	SER	5.7
1	B	332	ILE	5.4

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

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 0.9’ lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSR	LLDF	B-factors(Å ²)	Q<0.9
2	MAN	A	1448	11/12	0.35	31.92	108,113,120,122	0
2	MAN	A	1450	11/12	0.30	25.91	118,123,125,126	0
2	MAN	A	1449	11/12	0.33	11.05	96,102,106,107	0

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Mol	Type	Chain	Res	Atoms	RSR	LLDF	B-factors(\AA^2)	Q<0.9
2	NAG	A	1445	14/15	0.17	5.10	45,51,56,56	0
2	FUC	A	1451	10/11	0.17	1.79	61,63,66,66	0
2	NAG	A	1446	14/15	0.14	-0.02	48,52,56,63	0
2	BMA	A	1447	11/12	0.12	-1.65	70,80,90,97	0
2	MAN	A	1452	11/12	0.25	-	98,100,104,106	0

6.4 Ligands

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSR	LLDF	B-factors(\AA^2)	Q<0.9
3	CL	B	1445	1/1	0.06	-6.84	32,32,32,32	0

6.5 Other polymers

There are no such residues in this entry.