



# wwPDB X-ray Structure Validation Summary Report ⓘ

May 13, 2020 – 11:51 pm BST

PDB ID : 1HIM  
Title : STRUCTURAL EVIDENCE FOR INDUCED FIT AS A MECHANISM FOR  
ANTIBODY-ANTIGEN RECOGNITION  
Authors : Schulze-Gahmen, U.; Wilson, I.A.  
Deposited on : 1992-07-08  
Resolution : 2.90 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](mailto: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.

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

MolProbity : 4.02b-467  
Xtrriage (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) : 2.11

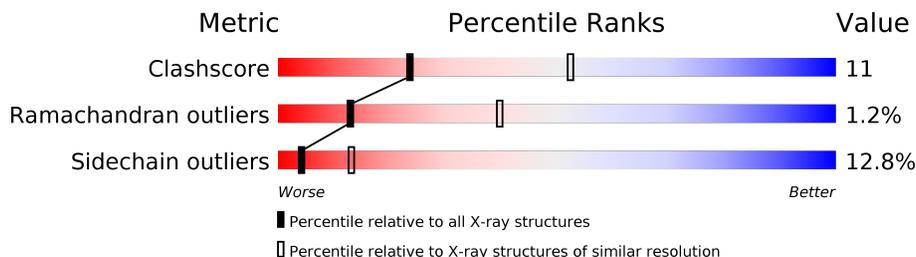
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.90 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	2172 (2.90-2.90)
Ramachandran outliers	138981	2115 (2.90-2.90)
Sidechain outliers	138945	2117 (2.90-2.90)

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  $\geq 3$ , 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  $\leq 5\%$

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	H	217	
1	J	217	
2	L	220	
2	M	220	
3	P	9	
4	R	10	

## 2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 6742 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 17/9 FAB (LIGHT CHAIN).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	H	217	Total 1680	C 1047	N 279	O 347	S 7	0	0	0
1	J	217	Total 1680	C 1047	N 279	O 347	S 7	0	0	0

- Molecule 2 is a protein called IGG2A-KAPPA 17/9 FAB (HEAVY CHAIN).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	L	215	Total 1621	C 1024	N 268	O 322	S 7	0	0	1
2	M	215	Total 1621	C 1024	N 268	O 322	S 7	0	0	1

- Molecule 3 is a protein called INFLUENZA HEMAGGLUTININ HA1 (STRAIN X47) (RESIDUES 100-108).

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	P	9	Total 66	C 42	N 9	O 15	0	0	1

- Molecule 4 is a protein called INFLUENZA HEMAGGLUTININ HA1 (STRAIN X47) (RESIDUES 100-108).

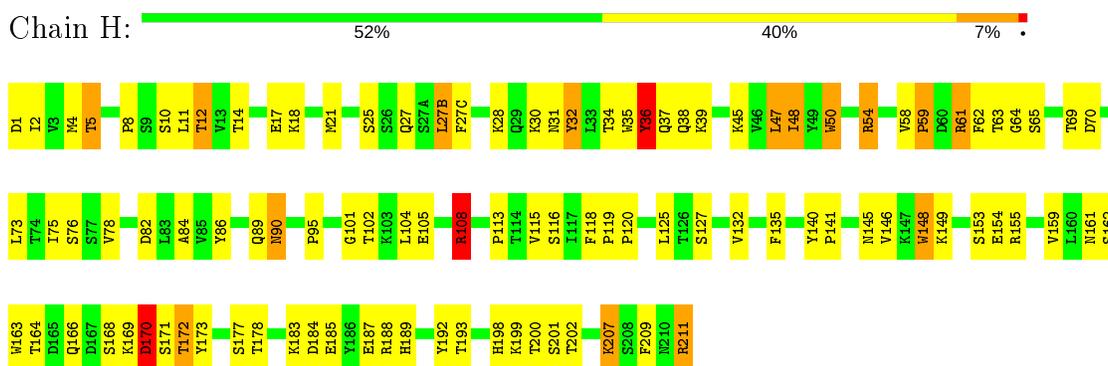
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
4	R	10	Total 74	C 48	N 10	O 16	0	0	1

### 3 Residue-property plots [i](#)

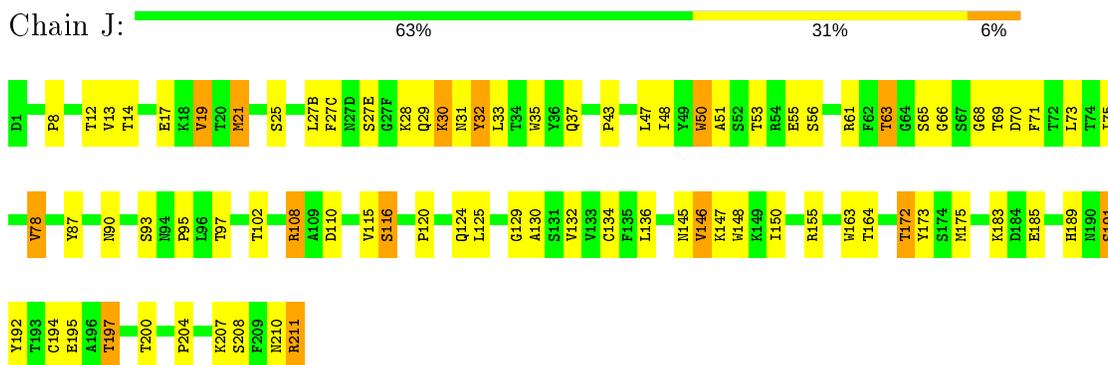
These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded according 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.

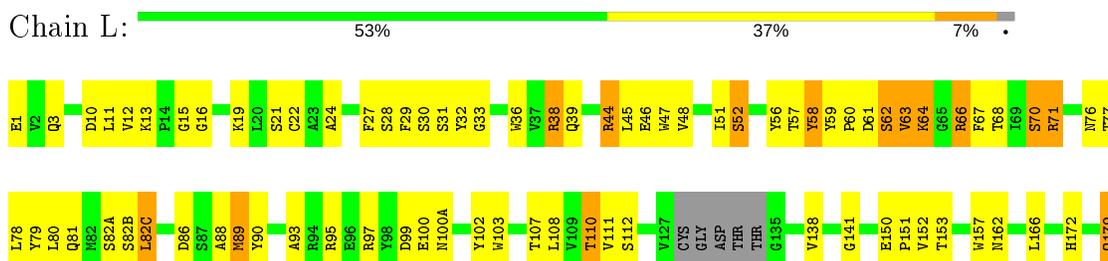
- Molecule 1: IGG2A-KAPPA 17/9 FAB (LIGHT CHAIN)



- Molecule 1: IGG2A-KAPPA 17/9 FAB (LIGHT CHAIN)



- Molecule 2: IGG2A-KAPPA 17/9 FAB (HEAVY CHAIN)





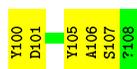
- Molecule 2: IGG2A-KAPPA 17/9 FAB (HEAVY CHAIN)

Chain M: 58% 31% 8%



- Molecule 3: INFLUENZA HEMAGGLUTININ HA1 (STRAIN X47) (RESIDUES 100-108)

Chain P: 44% 56%



- Molecule 4: INFLUENZA HEMAGGLUTININ HA1 (STRAIN X47) (RESIDUES 100-108)

Chain R: 70% 20% 10%



## 4 Data and refinement statistics

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

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	60.08Å 67.07Å 73.24Å 89.90° 101.80° 96.50°	Depositor
Resolution (Å)	8.00 – 2.90	Depositor
% Data completeness (in resolution range)	(Not available) (8.00-2.90)	Depositor
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	X-PLOR	Depositor
R, $R_{free}$	0.200 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	6742	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	14.0	wwPDB-VP

## 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: NH2

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	H	0.90	0/1718	1.77	33/2334 (1.4%)
1	J	0.90	0/1718	1.75	28/2334 (1.2%)
2	L	0.94	1/1661 (0.1%)	1.86	42/2263 (1.9%)
2	M	0.97	1/1661 (0.1%)	1.86	38/2263 (1.7%)
3	P	1.04	0/67	1.94	3/92 (3.3%)
4	R	1.08	0/75	1.93	3/103 (2.9%)
All	All	0.93	2/6900 (0.0%)	1.81	147/9389 (1.6%)

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	H	0	1
1	J	0	1
2	M	0	1
All	All	0	3

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	M	52	SER	CA-CB	-5.93	1.44	1.52
2	L	52	SER	CA-CB	-5.24	1.45	1.52

The worst 5 of 147 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	J	211	ARG	NE-CZ-NH2	-10.86	114.87	120.30
2	M	185	TYR	CB-CG-CD1	-9.98	115.01	121.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	H	32	TYR	CB-CG-CD2	-9.94	115.03	121.00
2	M	95	ARG	NE-CZ-NH2	-9.50	115.55	120.30
2	L	199	TRP	CD1-CG-CD2	9.49	113.89	106.30

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	H	36	TYR	Sidechain
1	J	192	TYR	Sidechain
2	M	56	TYR	Sidechain

## 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	H	1680	0	1612	43	0
1	J	1680	0	1612	33	0
2	L	1621	0	1576	39	0
2	M	1621	0	1576	37	0
3	P	66	0	51	3	0
4	R	74	0	62	1	0
All	All	6742	0	6489	148	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 148 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:J:120:PRO:HD3	1:J:132:VAL:HG22	1.65	0.77
2:M:51:ILE:HB	2:M:69:ILE:HD12	1.69	0.74
2:L:193:VAL:HG13	2:L:198:THR:HB	1.70	0.71
1:H:149:LYS:HB2	1:H:193:THR:HB	1.78	0.66
1:H:82:ASP:O	1:H:104:LEU:HD12	1.98	0.64

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	H	215/217 (99%)	203 (94%)	10 (5%)	2 (1%)	17	48
1	J	215/217 (99%)	201 (94%)	13 (6%)	1 (0%)	29	61
2	L	211/220 (96%)	191 (90%)	19 (9%)	1 (0%)	29	61
2	M	211/220 (96%)	189 (90%)	16 (8%)	6 (3%)	5	19
3	P	7/9 (78%)	6 (86%)	1 (14%)	0	100	100
4	R	8/10 (80%)	8 (100%)	0	0	100	100
All	All	867/893 (97%)	798 (92%)	59 (7%)	10 (1%)	13	40

5 of 10 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	M	214	ALA
2	L	16	GLY
2	M	163	SER
1	H	170	ASP
1	J	51	ALA

### 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	H	194/194 (100%)	163 (84%)	31 (16%)	2	7

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	J	194/194 (100%)	171 (88%)	23 (12%)	5	15
2	L	182/187 (97%)	161 (88%)	21 (12%)	5	17
2	M	182/187 (97%)	160 (88%)	22 (12%)	5	15
3	P	7/7 (100%)	7 (100%)	0	100	100
4	R	8/8 (100%)	7 (88%)	1 (12%)	4	14
All	All	767/777 (99%)	669 (87%)	98 (13%)	4	13

5 of 98 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	L	153	THR
1	J	21	MET
2	M	153	THR
2	L	166	LEU
2	L	193	VAL

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

Mol	Chain	Res	Type
2	L	39	GLN
2	L	76	ASN
1	J	31	ASN
1	H	198	HIS
1	J	29	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 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

### 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.