



# wwPDB X-ray Structure Validation Summary Report

Feb 28, 2014 – 08:40 AM GMT

PDB ID : 3EYO  
Title : Crystal structure of anti-human cytomegalovirus antibody 8F9  
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Deposited on : 2008-10-21  
Resolution : 2.50 Å(reported)

This is a wwPDB 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 <http://wwpdb.org/ValidationPDFNotes.html>

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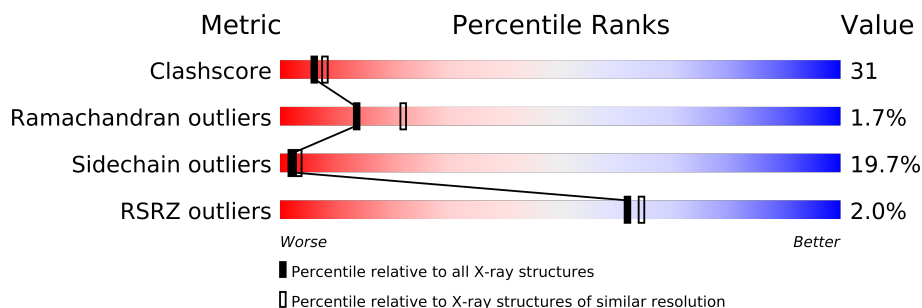
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity	:	4.02b-467
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 2.50 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	79885	3562 (2.50-2.50)
Ramachandran outliers	78287	3480 (2.50-2.50)
Sidechain outliers	78261	3482 (2.50-2.50)
RSRZ outliers	66119	2785 (2.50-2.50)

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. 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	216	
1	C	216	
2	B	242	
2	D	242	

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 6906 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 8f9 Fab.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	213	Total	C	N	O	S	0	0	0
			1643	1034	281	323	5			
1	C	214	Total	C	N	O	S	0	0	0
			1652	1039	282	326	5			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	MET	-	EXPRESSION TAG	PDB 3EYO
C	0	MET	-	EXPRESSION TAG	PDB 3EYO

- Molecule 2 is a protein called AD-2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	212	Total	C	N	O	S	0	0	0
			1598	1003	274	313	8			
2	D	218	Total	C	N	O	S	0	0	0
			1633	1021	283	319	10			

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	235	LEU	-	EXPRESSION TAG	PDB 3EYO
B	236	GLU	-	EXPRESSION TAG	PDB 3EYO
B	237	HIS	-	EXPRESSION TAG	PDB 3EYO
B	238	HIS	-	EXPRESSION TAG	PDB 3EYO
B	239	HIS	-	EXPRESSION TAG	PDB 3EYO
B	240	HIS	-	EXPRESSION TAG	PDB 3EYO
B	241	HIS	-	EXPRESSION TAG	PDB 3EYO
B	242	HIS	-	EXPRESSION TAG	PDB 3EYO
D	235	LEU	-	EXPRESSION TAG	PDB 3EYO
D	236	GLU	-	EXPRESSION TAG	PDB 3EYO

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Chain	Residue	Modelled	Actual	Comment	Reference
D	237	HIS	-	EXPRESSION TAG	PDB 3EYO
D	238	HIS	-	EXPRESSION TAG	PDB 3EYO
D	239	HIS	-	EXPRESSION TAG	PDB 3EYO
D	240	HIS	-	EXPRESSION TAG	PDB 3EYO
D	241	HIS	-	EXPRESSION TAG	PDB 3EYO
D	242	HIS	-	EXPRESSION TAG	PDB 3EYO

- Molecule 3 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	114	Total O 114 114	0	0
3	B	96	Total O 96 96	0	0
3	C	89	Total O 89 89	0	0
3	D	81	Total O 81 81	0	0

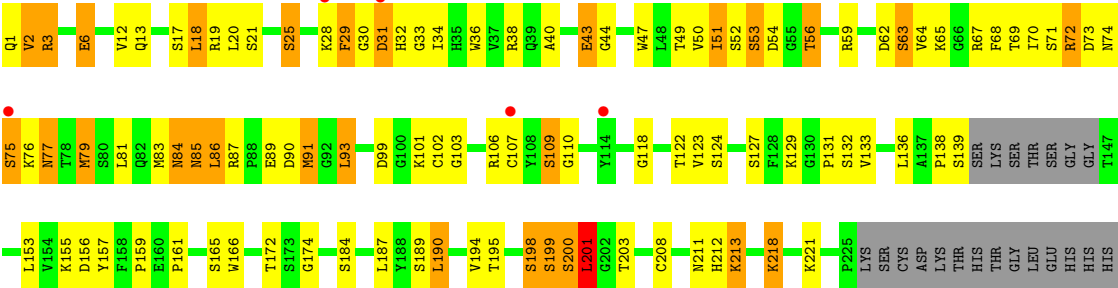


HIS

HIS

● Molecule 2: AD-2

Chain D: 



HIS

HIS

HIS

## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	63.03Å 110.73Å 180.25Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.00 – 2.50 37.77 – 2.39	Depositor EDS
% Data completeness (in resolution range)	(Not available) (50.00-2.50) 94.1 (37.77-2.39)	Depositor EDS
$R_{merge}$	0.07	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.09 (at 2.39Å)	Xtriage
Refinement program	CNS 1.0	Depositor
R, $R_{free}$	0.241 , 0.268 0.245 , (Not available)	Depositor DCC
$R_{free}$ test set	No test flags present.	DCC
Wilson B-factor (Å <sup>2</sup> )	40.0	Xtriage
Anisotropy	0.326	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.37 , 33.8	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.34$	Xtriage
Outliers	0 of 50334 reflections	Xtriage
$F_o, F_c$ correlation	0.92	EDS
Total number of atoms	6906	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	40.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.47% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

## 5 Model quality

### 5.1 Standard geometry

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	0.72	3/1681 (0.2%)	1.17	12/2285 (0.5%)
1	C	0.63	1/1690 (0.1%)	0.97	3/2297 (0.1%)
2	B	0.63	1/1634 (0.1%)	1.03	8/2217 (0.4%)
2	D	0.68	0/1670	1.15	11/2265 (0.5%)
All	All	0.67	5/6675 (0.1%)	1.08	34/9064 (0.4%)

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

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	82	ASP	CA-C	-6.20	1.36	1.52
1	A	82	ASP	CB-CG	-6.13	1.38	1.51
1	C	124	GLU	CB-CG	-5.40	1.41	1.52
1	A	82	ASP	CA-CB	-5.18	1.42	1.53
2	B	29	PHE	CB-CG	-5.15	1.42	1.51

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

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	61	ARG	NE-CZ-NH2	-16.56	112.02	120.30
2	D	139	SER	N-CA-CB	-12.44	91.84	110.50
1	A	61	ARG	NE-CZ-NH1	9.81	125.20	120.30
2	D	138	PRO	CA-C-N	-9.10	97.19	117.20
1	A	77	ARG	NE-CZ-NH1	-8.03	116.28	120.30

There are no chirality outliers.



All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	61	ARG	Sidechain

## 5.2 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 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	1643	0	1613	107	0
1	C	1652	0	1619	82	0
2	B	1598	0	1555	106	0
2	D	1633	0	1585	110	0
3	A	114	0	0	12	0
3	B	96	0	0	9	0
3	C	89	0	0	8	0
3	D	81	0	0	6	0
All	All	6906	0	6372	397	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 31.

The worst 5 of 397 close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:34:THR:HG21	1:A:46:LEU:HD11	1.22	1.12
1:A:91:ARG:NH1	2:B:109:SER:O	1.83	1.11
2:B:62:ASP:HA	2:B:65:LYS:HE2	1.36	1.07
2:B:30:GLY:O	2:B:53:SER:HB2	1.57	1.04
1:C:28:SER:OG	1:C:68:GLY:HA2	1.56	1.03

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	211/216 (98%)	197 (93%)	9 (4%)	5 (2%)	9	13
1	C	212/216 (98%)	199 (94%)	12 (6%)	1 (0%)	38	60
2	B	206/242 (85%)	187 (91%)	17 (8%)	2 (1%)	22	38
2	D	214/242 (88%)	191 (89%)	17 (8%)	6 (3%)	8	10
All	All	843/916 (92%)	774 (92%)	55 (6%)	14 (2%)	14	22

5 of 14 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	32	TYR
2	B	52	SER
2	D	2	VAL
2	D	72	ARG
1	A	30	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	184/187 (98%)	141 (77%)	43 (23%)	1	1
1	C	185/187 (99%)	157 (85%)	28 (15%)	4	7
2	B	180/204 (88%)	148 (82%)	32 (18%)	2	4
2	D	183/204 (90%)	142 (78%)	41 (22%)	1	2
All	All	732/782 (94%)	588 (80%)	144 (20%)	2	3

5 of 144 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	161	PRO
1	C	20	THR
2	D	172	THR
2	B	173	SER
2	B	216	ASN

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 15 such sidechains are listed below:

Mol	Chain	Res	Type
2	B	117	GLN
2	B	176	HIS
1	C	211	ASN
2	B	77	ASN
1	C	125	GLN

### 5.3.3 RNA ⓘ

There are no RNA chains 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 carbohydrates in this entry.

## 5.6 Ligand geometry ⓘ

There are no ligands in this entry.

## 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 ⓘ

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	213/216 (98%)	-0.05	4 (1%) 64 66	14, 36, 60, 75	0
1	C	214/216 (99%)	-0.02	2 (0%) 81 82	23, 42, 56, 69	0
2	B	212/242 (87%)	0.04	6 (2%) 50 53	14, 41, 72, 82	0
2	D	218/242 (90%)	0.01	5 (2%) 57 60	17, 39, 65, 73	0
All	All	857/916 (93%)	-0.00	17 (1%) 62 64	14, 39, 66, 82	0

The worst 5 of 17 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	77	ARG	3.5
1	A	24	ARG	3.2
2	B	28	LYS	3.1
2	D	75	SER	3.1
2	B	75	SER	2.8

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

There are no non-standard protein/DNA/RNA residues in this entry.

### 6.3 Carbohydrates ⓘ

There are no carbohydrates in this entry.

### 6.4 Ligands ⓘ

There are no ligands in this entry.

## 6.5 Other polymers ⓘ

There are no such residues in this entry.