



# wwPDB NMR Structure Validation Summary Report ⓘ

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PDB ID : 1MZI  
Title : Solution ensemble structures of HIV-1 gp41 2F5 mAb epitope  
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This is a wwPDB NMR 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/NMRValidationReportHelp>

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  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
RCI : v\_1n\_11\_5\_13\_A (Berjanski et al., 2005)  
PANAV : Wang et al. (2010)  
ShiftChecker : 2.26  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.26

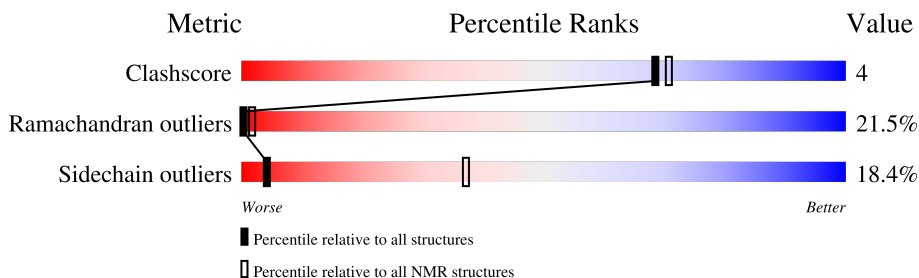
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*SOLUTION NMR*

The overall completeness of chemical shifts assignment was not calculated.

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)	NMR archive (#Entries)
Clashscore	158937	12864
Ramachandran outliers	154571	11451
Sidechain outliers	154315	11428

The table below summarises the geometric issues observed across the polymeric chains and their fit to the experimental data. The red, orange, yellow and green segments indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. A cyan segment indicates the fraction of residues that are not part of the well-defined cores, and 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  $\leq 5\%$

Mol	Chain	Length	Quality of chain
1	A	13	

## 2 Ensemble composition and analysis

This entry contains 81 models. The atoms present in the NMR models are not consistent. Some calculations may have failed as a result. All residues are included in the validation scores.

Cyrange was unable to find well-defined residues.

Error message: Only domains with < 8 residues could be identified.

NmrClust was unable to cluster the ensemble.

Error message: Wrapper check: not enough residues in core to run NmrClust

### 3 Entry composition

There is only 1 type of molecule in this entry. The entry contains 225 atoms, of which 110 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called 2F5 epitope of HIV-1 gp41 fusion protein.

Mol	Chain	Residues	Atoms					Trace
			Total	C	H	N	O	
1	A	13	225	76	110	17	22	0

## 4 Residue-property plots

### 4.1 Average score per residue in the NMR ensemble

These plots are provided for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic is the same as shown in the summary in section 1 of this report. The second graphic shows the sequence where residues are colour-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 outliers are shown as green connectors. Residues which are classified as ill-defined in the NMR ensemble, are shown in cyan with an underline colour-coded according to the previous scheme. Residues which were present in the experimental sample, but not modelled in the final structure are shown in grey.

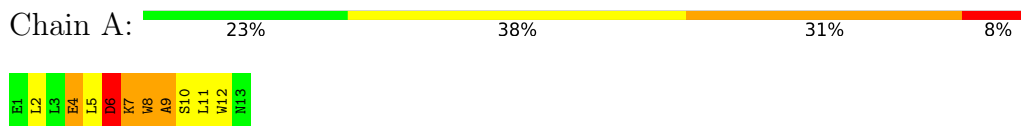
- Molecule 1: 2F5 epitope of HIV-1 gp41 fusion protein



### 4.2 Residue scores for the first model from the NMR ensemble

No representative models were identified. Colouring as in section 4.1 above.

- Molecule 1: 2F5 epitope of HIV-1 gp41 fusion protein



## 5 Refinement protocol and experimental data overview

The models were refined using the following method: *Ensemble generation with MEDUSA, Clustering analysis with NMRCLUST, Statistical analysis of the ensemble with NAMFIS.*

Of the 6400 calculated structures, 81 were deposited, based on the following criterion: *Base set ensemble representative of the conformational space experimentally allowed.*

The following table shows the software used for structure solution, optimisation and refinement.

Software name	Classification	Version
DGII	refinement	MSI
NAMFIS	refinement	1.0
MEDUSA	refinement	in home
NMRCLUST	refinement	1.2

No chemical shift data was provided.

## 6 Model quality i

### 6.1 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 (average) 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	1.29±0.13	0±0/118 ( 0.1± 0.3%)	1.76±0.29	4±3/159 ( 2.5± 1.7%)
All	All	1.30	8/9558 ( 0.1%)	1.78	321/12879 ( 2.5%)

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	Planarity
1	A	0.1±0.4	1.3±1.2
All	All	9	108

All unique bond outliers are listed below. They are sorted according to the Z-score of the worst occurrence in the ensemble.

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)	Models	
								Worst	Total
1	A	9	ALA	CA-CB	12.44	1.78	1.52	27	7
1	A	7	LYS	N-CA	6.74	1.59	1.46	1	1

5 of 52 unique angle outliers are listed below. They are sorted according to the Z-score of the worst occurrence in the ensemble.

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)	Models	
								Worst	Total
1	A	7	LYS	CB-CG-CD	12.81	144.91	111.60	73	1
1	A	12	TRP	CB-CA-C	12.12	134.64	110.40	18	10
1	A	6	ASP	N-CA-CB	12.02	132.23	110.60	7	4
1	A	9	ALA	N-CA-CB	-11.93	93.40	110.10	64	18
1	A	9	ALA	CB-CA-C	11.65	127.57	110.10	27	7

All unique chiral outliers are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type	Atoms	Models (Total)
1	A	11	LEU	CA	3
1	A	3	LEU	CA	3
1	A	10	SER	CA	1
1	A	12	TRP	CA	1
1	A	5	LEU	CA	1

5 of 12 unique planar outliers are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type	Group	Models (Total)
1	A	4	GLU	Peptide	16
1	A	10	SER	Peptide	16
1	A	7	LYS	Peptide	13
1	A	8	TRP	Peptide	13
1	A	6	ASP	Peptide	12

## 6.2 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 each 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 averaged over the ensemble.

Mol	Chain	Non-H	H(model)	H(added)	Clashes
1	A	115	111	111	1±2
All	All	9315	8911	8991	70

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 4.

5 of 41 unique clashes are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:9:ALA:CA	1:A:9:ALA:CB	1.59	1.75	49	3
1:A:6:ASP:OD1	1:A:9:ALA:HB2	0.70	1.85	8	1
1:A:9:ALA:CB	1:A:9:ALA:C	0.66	2.61	49	2
1:A:6:ASP:CG	1:A:9:ALA:HB2	0.66	2.11	8	2
1:A:5:LEU:HD11	1:A:8:TRP:HB3	0.65	1.68	81	1



## 6.3 Torsion angles [i](#)

### 6.3.1 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 PDB entries followed by that with respect to all NMR entries. 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	11/13 (85%)	5±2 (47±21%)	3±2 (32±16%)	2±2 (22±14%)	0	2
All	All	891/1053 (85%)	417 (47%)	282 (32%)	192 (22%)	0	2

5 of 11 unique Ramachandran outliers are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type	Models (Total)
1	A	11	LEU	25
1	A	6	ASP	23
1	A	7	LYS	22
1	A	10	SER	18
1	A	3	LEU	18

### 6.3.2 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 PDB entries followed by that with respect to all NMR entries. 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	12/12 (100%)	10±1 (82±10%)	2±1 (18±10%)	4	37
All	All	972/972 (100%)	793 (82%)	179 (18%)	4	37

5 of 11 unique residues with a non-rotameric sidechain are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type	Models (Total)
1	A	11	LEU	41
1	A	8	TRP	39
1	A	3	LEU	24
1	A	12	TRP	21
1	A	6	ASP	14

### 6.3.3 RNA [i](#)

There are no RNA molecules in this entry.

### 6.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

### 6.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

### 6.6 Ligand geometry [i](#)

There are no ligands in this entry.

### 6.7 Other polymers [i](#)

There are no such molecules in this entry.

### 6.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 7 Chemical shift validation

No chemical shift data were provided