



wwPDB X-ray Structure Validation Summary Report ⓘ

May 27, 2020 – 03:09 am BST

PDB ID : 2Q06
Title : Crystal structure of Influenza A Virus H5N1 Nucleoprotein
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Deposited on : 2007-05-21
Resolution : 3.30 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

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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

MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.11
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

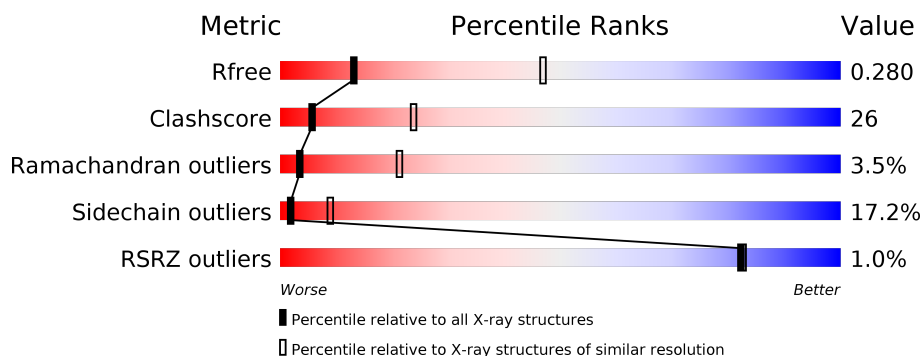
1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.30 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}	130704	1149 (3.34-3.26)
Clashscore	141614	1205 (3.34-3.26)
Ramachandran outliers	138981	1183 (3.34-3.26)
Sidechain outliers	138945	1182 (3.34-3.26)
RSRZ outliers	127900	1115 (3.34-3.26)

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 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 $\leq 5\%$. 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	A	504	<div> <div>%</div> <div> <div></div> <div>48%</div> <div>35%</div> <div>9%</div> <div>•</div> <div>7%</div> </div> </div>
1	B	504	<div> <div>%</div> <div> <div></div> <div>47%</div> <div>36%</div> <div>9%</div> <div>•</div> <div>8%</div> </div> </div>

2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 7343 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 Nucleoprotein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	467	Total	C	N	O	S	0	0	0
			3678	2269	696	686	27			
1	B	465	Total	C	N	O	S	0	0	0
			3665	2260	695	683	27			

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-5	GLY	-	EXPRESSION TAG	UNP Q9PX50
A	-4	SER	-	EXPRESSION TAG	UNP Q9PX50
A	-3	PRO	-	EXPRESSION TAG	UNP Q9PX50
A	-2	GLY	-	EXPRESSION TAG	UNP Q9PX50
A	-1	ILE	-	EXPRESSION TAG	UNP Q9PX50
A	0	LEU	-	EXPRESSION TAG	UNP Q9PX50
B	-5	GLY	-	EXPRESSION TAG	UNP Q9PX50
B	-4	SER	-	EXPRESSION TAG	UNP Q9PX50
B	-3	PRO	-	EXPRESSION TAG	UNP Q9PX50
B	-2	GLY	-	EXPRESSION TAG	UNP Q9PX50
B	-1	ILE	-	EXPRESSION TAG	UNP Q9PX50
B	0	LEU	-	EXPRESSION TAG	UNP Q9PX50

G485	G486	N492	A493	E494	E495	TTR	ASP	ASN	H397	Q398	Q399	R400	A401	S402	I406	R416	A423	T424	I425	F429	K430	Q431	N432	T433	E434	G435	R436	T437	S438	D439	N440	R441	T442	E443	I444	I445	R446	N447	S450	A451	R452	F453	E454	Q459	V463	F464	E465	L466	S467	D468	E469	K470	A471	T472	P477	N481	S482	N483	E484	T396	T395	S392	R391	T390	R389	I388	A387	W386	Y385	R384	S383	R382	L381	E380	L379	M374	A373	E372	V371	H370	E369	N368	S367	A366	I365	Q364	R361	L358	L356	V352	I353	R348	R347	F346	S345	S344	V343	R342	L341	D340	E339	C333	V329	L328	A323	P322	N321	E320	N319	F318	R317	I217	A218	R221	L225	L226	P230	T232	Q235	R236	A237	N238	V242	S245	R246	Q249	E252	I253	E254	R267	I270	A179	A178	G177	S176	R175	R174	P173	L172	L166	S165	C164	M163	R162	P161	D160	R156	V155	L154	A153	R152	T151	R150	T147	H140	W139	T134
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4 Data and refinement statistics

Property	Value	Source
Space group	P 21 3	Depositor
Cell constants a, b, c, α , β , γ	153.58Å 153.58Å 153.58Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	46.32 – 3.30 46.31 – 3.30	Depositor EDS
% Data completeness (in resolution range)	99.7 (46.32-3.30) 99.7 (46.31-3.30)	Depositor EDS
R_{merge}	0.14	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.43 (at 3.32Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.202 , 0.279 0.203 , 0.280	Depositor DCC
R_{free} test set	945 reflections (5.14%)	wwPDB-VP
Wilson B-factor (Å ²)	83.9	Xtriage
Anisotropy	0.000	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 76.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.041 for l,-k,h	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	7343	wwPDB-VP
Average B, all atoms (Å ²)	93.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.32% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 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	A	0.45	0/3737	0.64	0/5024
1	B	0.46	0/3723	0.62	0/5003
All	All	0.45	0/7460	0.63	0/10027

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	2

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	31	ARG	Sidechain
1	A	479	PHE	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	A	3678	0	3639	180	0
1	B	3665	0	3639	197	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	7343	0	7278	373	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 26.

The worst 5 of 373 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:A:204:ARG:HA	1:A:204:ARG:HE	1.20	1.06
1:A:90:LYS:HD3	1:A:90:LYS:H	1.18	1.02
1:A:103:LYS:HD2	1:A:103:LYS:H	1.24	0.99
1:B:152:ARG:O	1:B:156:ARG:HG2	1.69	0.92
1:B:62:THR:HG22	1:B:66:MET:HE3	1.51	0.91

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	A	463/504 (92%)	389 (84%)	58 (12%)	16 (4%)	3	21
1	B	461/504 (92%)	389 (84%)	56 (12%)	16 (4%)	3	21
All	All	924/1008 (92%)	778 (84%)	114 (12%)	32 (4%)	3	21

5 of 32 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	398	GLN
1	A	493	ALA
1	B	372	GLU
1	A	88	ASP

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Mol	Chain	Res	Type
1	A	89	PRO

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	A	387/420 (92%)	321 (83%)	66 (17%)	2	9
1	B	387/420 (92%)	320 (83%)	67 (17%)	2	8
All	All	774/840 (92%)	641 (83%)	133 (17%)	2	9

5 of 133 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	472	THR
1	B	72	ASP
1	B	439	ASP
1	A	478	SER
1	B	25	ILE

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 28 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	124	ASN
1	B	149	GLN
1	B	399	GLN
1	B	140	HIS
1	B	144	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	A	467/504 (92%)	-0.12	4 (0%) 84 84	31, 93, 109, 119	0
1	B	465/504 (92%)	-0.09	5 (1%) 80 81	73, 92, 106, 116	0
All	All	932/1008 (92%)	-0.11	9 (0%) 82 82	31, 93, 109, 119	0

The worst 5 of 9 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	21	ASN	10.3
1	B	97	TYR	2.4
1	B	22	ALA	2.3
1	A	401	ALA	2.3
1	A	482	SER	2.2

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.