



Full wwPDB X-ray Structure Validation Report ⓘ

Jul 1, 2021 – 03:03 pm BST

PDB ID : 7NT8
Title : Influenza virus H3N2 nucleoprotein - R416A mutant
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Deposited on : 2021-03-09
Resolution : 2.22 Å(reported)

This is a Full wwPDB X-ray Structure Validation 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 : 2.22
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) : 2.22

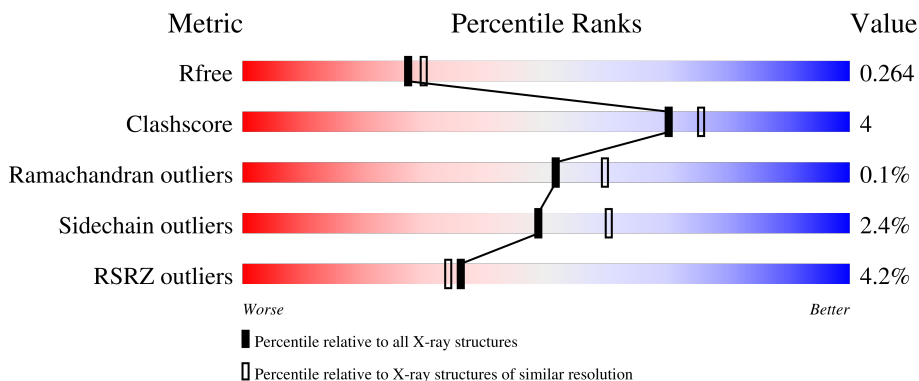
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.22 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	5912 (2.24-2.20)
Clashscore	141614	6646 (2.24-2.20)
Ramachandran outliers	138981	6543 (2.24-2.20)
Sidechain outliers	138945	6544 (2.24-2.20)
RSRZ outliers	127900	5797 (2.24-2.20)

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 of 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	729	
1	B	729	

2 Entry composition i

There are 2 unique types of molecules in this entry. The entry contains 13527 atoms, of which 6714 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 Glutathione S-transferase class-mu 26 kDa isozyme, Nucleoprotein.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	A	439	6870	2144	3421	629	647	29	0	0	0
1	B	419	6606	2056	3293	611	618	28	0	0	0

There are 26 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-12	SER	-	linker	UNP P08515
A	-11	ASP	-	linker	UNP P08515
A	-10	LEU	-	linker	UNP P08515
A	-9	GLU	-	linker	UNP P08515
A	-8	VAL	-	linker	UNP P08515
A	-7	LEU	-	linker	UNP P08515
A	-6	PHE	-	linker	UNP P08515
A	-5	GLN	-	linker	UNP P08515
A	-4	GLY	-	linker	UNP P08515
A	-3	PRO	-	linker	UNP P08515
A	-2	LEU	-	linker	UNP P08515
A	-1	GLY	-	linker	UNP P08515
A	0	SER	-	linker	UNP P08515
B	-12	SER	-	linker	UNP P08515
B	-11	ASP	-	linker	UNP P08515
B	-10	LEU	-	linker	UNP P08515
B	-9	GLU	-	linker	UNP P08515
B	-8	VAL	-	linker	UNP P08515
B	-7	LEU	-	linker	UNP P08515
B	-6	PHE	-	linker	UNP P08515
B	-5	GLN	-	linker	UNP P08515
B	-4	GLY	-	linker	UNP P08515
B	-3	PRO	-	linker	UNP P08515
B	-2	LEU	-	linker	UNP P08515

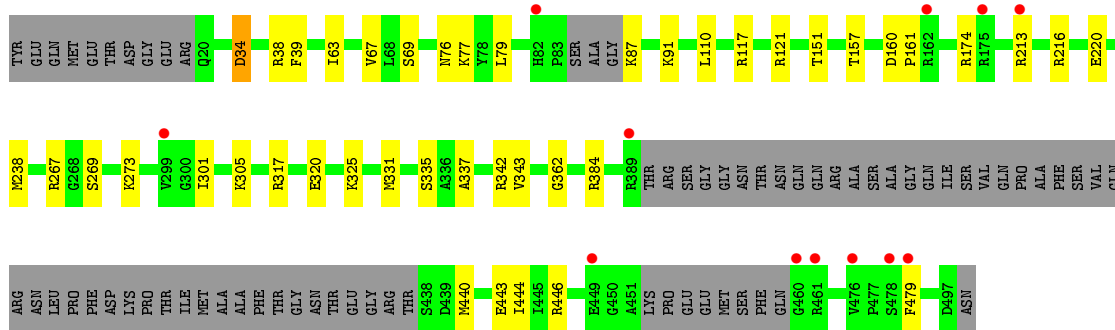
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Chain	Residue	Modelled	Actual	Comment	Reference
B	-1	GLY	-	linker	UNP P08515
B	0	SER	-	linker	UNP P08515

- Molecule 2 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	26	Total O 26 26	0	0
2	B	25	Total O 25 25	0	0



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	87.78Å 63.38Å 105.95Å 90.00° 98.32° 90.00°	Depositor
Resolution (Å)	86.85 – 2.22 104.84 – 2.22	Depositor EDS
% Data completeness (in resolution range)	66.6 (86.85-2.22) 62.6 (104.84-2.22)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.37 (at 2.22Å)	Xtrriage
Refinement program	PHENIX 1.18rc2_3794	Depositor
R, R_{free}	0.212 , 0.265 0.212 , 0.264	Depositor DCC
R_{free} test set	1830 reflections (4.81%)	wwPDB-VP
Wilson B-factor (Å ²)	41.0	Xtrriage
Anisotropy	0.100	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 44.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	13527	wwPDB-VP
Average B, all atoms (Å ²)	66.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.53% 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	0.28	0/3508	0.44	0/4714
1	B	0.26	0/3367	0.43	0/4518
All	All	0.27	0/6875	0.43	0/9232

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

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	3449	3421	3421	23	0
1	B	3313	3293	3293	28	0
2	A	26	0	0	0	0
2	B	25	0	0	1	0
All	All	6813	6714	6714	49	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 4.

All (49) 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:307:LEU:O	1:A:310:SER:OG	2.00	0.79

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:317:ARG:NH2	1:B:362:GLY:O	2.27	0.67
1:A:449:GLU:OE2	1:A:449:GLU:HA	1.95	0.67
1:B:77:LYS:NZ	2:B:501:HOH:O	2.29	0.65
1:B:343:VAL:HG22	1:B:479:PHE:CZ	2.38	0.58
1:B:34:ASP:OD2	1:B:38:ARG:NH2	2.36	0.58
1:B:91:LYS:HB3	1:B:110:LEU:HD22	1.85	0.58
1:B:335:SER:O	1:B:335:SER:OG	2.18	0.58
1:B:174:ARG:HG3	1:B:174:ARG:HH11	1.70	0.56
1:A:449:GLU:OE2	1:A:449:GLU:CA	2.52	0.56
1:A:426:MET:O	1:A:430:THR:HG23	2.04	0.56
1:B:69:SER:HA	1:B:79:LEU:HD22	1.89	0.54
1:B:39:PHE:CZ	1:B:67:VAL:HG22	2.43	0.54
1:B:216:ARG:HG3	1:B:216:ARG:HH11	1.72	0.54
1:B:157:THR:HG22	1:B:157:THR:O	2.08	0.53
1:A:73:GLU:OE2	1:B:117:ARG:NH1	2.41	0.53
1:A:348:ARG:NH2	1:A:380:GLU:O	2.42	0.52
1:A:157:THR:HG21	1:A:191:MET:HG3	1.91	0.51
1:B:174:ARG:HG3	1:B:174:ARG:NH1	2.26	0.51
1:A:255:ASP:OD2	1:A:441:ARG:NH1	2.44	0.50
1:A:317:ARG:NH2	1:A:362:GLY:O	2.45	0.50
1:B:238:MET:CE	1:B:444:ILE:HD12	2.41	0.50
1:B:238:MET:HE1	1:B:444:ILE:HD12	1.95	0.48
1:A:341:LEU:HD11	1:A:487:TYR:HA	1.95	0.48
1:B:69:SER:CA	1:B:79:LEU:HD22	2.43	0.47
1:A:72:ASP:O	1:A:75:ARG:HD3	2.14	0.47
1:B:151:THR:HG23	1:B:161:PRO:HB3	1.95	0.47
1:A:216:ARG:NH2	1:A:243:ARG:O	2.48	0.47
1:B:216:ARG:NH1	1:B:220:GLU:OE2	2.48	0.47
1:A:157:THR:O	1:A:157:THR:HG22	2.15	0.46
1:A:252:GLU:OE1	1:A:252:GLU:N	2.46	0.46
1:B:63:ILE:O	1:B:67:VAL:HG23	2.15	0.46
1:A:47:LEU:O	1:A:98:LYS:NZ	2.44	0.45
1:A:21:ASN:N	1:A:24:GLU:OE1	2.50	0.45
1:B:160:ASP:OD2	1:B:161:PRO:HD2	2.18	0.44
1:A:210:GLU:O	1:A:210:GLU:HG3	2.17	0.44
1:B:76:ASN:HA	1:B:79:LEU:O	2.18	0.44
1:A:75:ARG:HD2	1:B:121:ARG:HD3	2.01	0.43
1:B:443:GLU:OE2	1:B:446:ARG:NH2	2.50	0.43
1:B:301:ILE:HG12	1:B:305:LYS:HG3	2.00	0.43
1:A:384:ARG:HD2	1:A:384:ARG:N	2.35	0.42
1:A:208:ARG:O	1:A:211:ASN:OD1	2.37	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:372:ASP:OD1	1:A:372:ASP:N	2.53	0.42
1:B:273:LYS:HE3	1:B:273:LYS:HB3	1.79	0.42
1:A:198:LYS:O	1:A:201:ILE:HG13	2.20	0.41
1:B:331:MET:CE	1:B:337:ALA:HA	2.50	0.41
1:B:216:ARG:HH11	1:B:216:ARG:CG	2.32	0.41
1:B:320:GLU:OE1	1:B:325:LYS:NZ	2.45	0.41
1:A:93:GLY:HA3	1:A:109:VAL:O	2.21	0.41

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	433/729 (59%)	420 (97%)	12 (3%)	1 (0%)	47	54
1	B	411/729 (56%)	400 (97%)	11 (3%)	0	100	100
All	All	844/1458 (58%)	820 (97%)	23 (3%)	1 (0%)	51	60

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	439	ASP

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	365/620 (59%)	356 (98%)	9 (2%)	47	58
1	B	351/620 (57%)	343 (98%)	8 (2%)	50	62
All	All	716/1240 (58%)	699 (98%)	17 (2%)	49	60

All (17) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	214	LYS
1	A	238	MET
1	A	245	SER
1	A	287	SER
1	A	311	GLN
1	A	368	ASN
1	A	372	ASP
1	A	384	ARG
1	A	389	ARG
1	B	34	ASP
1	B	87	LYS
1	B	213	ARG
1	B	267	ARG
1	B	269	SER
1	B	342	ARG
1	B	384	ARG
1	B	440	MET

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	311	GLN
1	B	76	ASN
1	B	122	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 monosaccharides 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

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	439/729 (60%)	0.53	24 (5%) 25 23	34, 60, 99, 116	0
1	B	419/729 (57%)	0.41	12 (2%) 51 49	31, 54, 87, 108	0
All	All	858/1458 (58%)	0.47	36 (4%) 36 34	31, 57, 94, 116	0

All (36) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	434	GLU	4.9
1	B	460	GLY	4.7
1	B	461	ARG	4.1
1	A	85	ALA	4.0
1	A	435	GLY	3.8
1	A	432	ASN	3.6
1	A	388	ILE	3.4
1	A	436	ARG	3.3
1	A	299	VAL	3.3
1	B	82	HIS	3.2
1	A	246	ARG	3.2
1	B	476	VAL	3.1
1	B	479	PHE	3.1
1	A	479	PHE	3.0
1	A	83	PRO	2.9
1	B	213	ARG	2.8
1	B	299	VAL	2.8
1	A	86	GLY	2.7
1	A	440	MET	2.7
1	A	178	ALA	2.6
1	A	462	GLY	2.6
1	A	472	ALA	2.5
1	A	213	ARG	2.5
1	A	389	ARG	2.5

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Mol	Chain	Res	Type	RSRZ
1	B	175	ARG	2.4
1	A	84	SER	2.4
1	A	439	ASP	2.4
1	A	477	PRO	2.3
1	A	418	LEU	2.3
1	A	210	GLU	2.2
1	B	162	ARG	2.2
1	B	449	GLU	2.2
1	B	389	ARG	2.1
1	B	478	SER	2.1
1	A	451	ALA	2.1
1	A	384	ARG	2.0

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 monosaccharides 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.