



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 12, 2026 – 11:26 AM UTC

PDB ID : 6NK3 / pdb_00006nk3
Title : Crystal structure of murine Mxra8 ectodomain
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Deposited on : 2019-01-04
Resolution : 2.20 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 types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

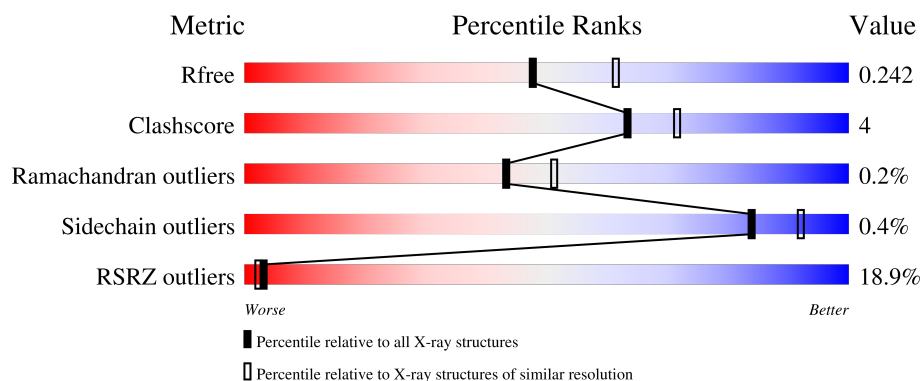
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.20 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}	180053	6164 (2.20-2.20)
Clashscore	190562	6851 (2.20-2.20)
Ramachandran outliers	187476	6768 (2.20-2.20)
Sidechain outliers	187428	6769 (2.20-2.20)
RSRZ outliers	180081	6166 (2.20-2.20)

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	274	19% 86% 10% .
1	B	274	18% 86% 11% .

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 4523 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 Matrix remodeling-associated protein 8.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	263	Total	C	N	O	S	0	0	0
			2124	1314	410	391	9			
1	B	265	Total	C	N	O	S	0	0	0
			2134	1320	412	393	9			

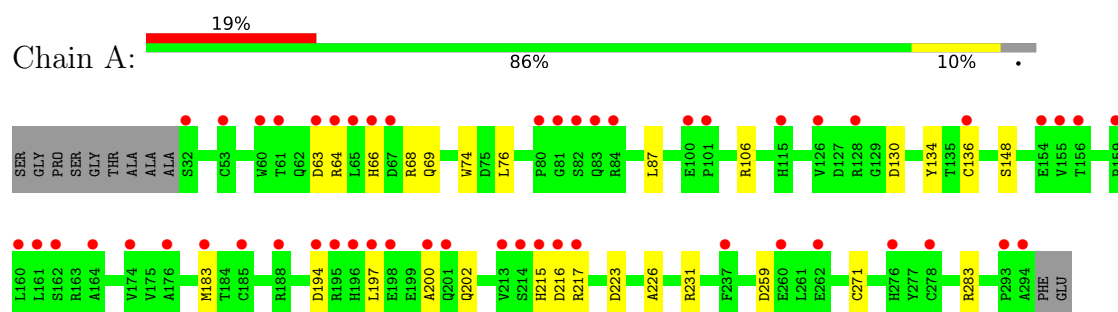
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	130	Total	O	0	0
			130	130		
2	B	135	Total	O	0	0
			135	135		

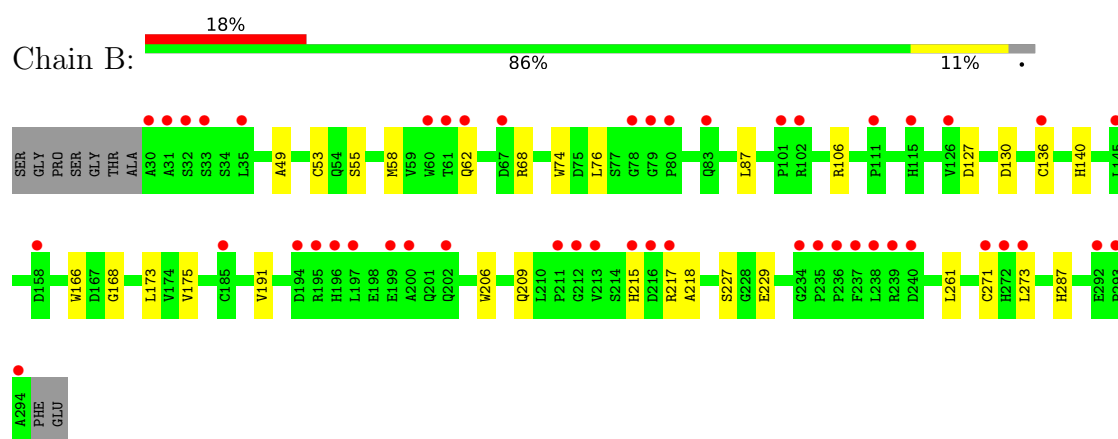
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide 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 and electron density. 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. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). 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.

- Molecule 1: Matrix remodeling-associated protein 8



- Molecule 1: Matrix remodeling-associated protein 8



4 Data and refinement statistics

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, α , β , γ	72.55Å 142.70Å 195.38Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.46 – 2.20 48.46 – 2.20	Depositor EDS
% Data completeness (in resolution range)	99.4 (48.46-2.20) 99.4 (48.46-2.20)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.21 (at 2.20Å)	Xtriage
Refinement program	PHENIX 1.12	Depositor
R, R_{free}	0.199 , 0.226 (Not available) , 0.242	Depositor DCC
R_{free} test set	1578 reflections (3.04%)	wwPDB-VP
Wilson B-factor (Å ²)	51.2	Xtriage
Anisotropy	0.230	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 56.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	4523	wwPDB-VP
Average B, all atoms (Å ²)	70.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.69% 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	0.12	0/2176	0.35	0/2953
1	B	0.12	0/2186	0.35	0/2967
All	All	0.12	0/4362	0.35	0/5920

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	2124	0	2024	15	0
1	B	2134	0	2034	18	0
2	A	130	0	0	0	0
2	B	135	0	0	1	0
All	All	4523	0	4058	33	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 (33) 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:66:HIS:HB3	1:A:69:GLN:HB2	1.74	0.70

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:68:ARG:HH12	1:A:194:ASP:HA	1.61	0.65
1:A:202:GLN:HB2	1:A:226:ALA:HB2	1.78	0.65
1:B:106:ARG:NH1	1:B:127:ASP:OD1	2.33	0.62
1:A:106:ARG:NH2	1:A:130:ASP:OD2	2.33	0.62
1:B:106:ARG:NH1	1:B:130:ASP:OD2	2.34	0.60
1:B:58:MET:HG2	1:B:273:LEU:HD22	1.88	0.54
1:A:76:LEU:HB2	1:A:87:LEU:HD11	1.91	0.53
1:B:140:HIS:CD2	1:B:191:VAL:HG22	2.46	0.51
1:B:62:GLN:NE2	1:B:68:ARG:HH12	2.09	0.49
1:A:215:HIS:C	1:A:217:ARG:H	2.22	0.47
1:A:223:ASP:HB2	1:A:231:ARG:HB2	1.97	0.47
1:B:173:LEU:HG	1:B:175:VAL:HG23	1.98	0.46
1:B:215:HIS:C	1:B:217:ARG:H	2.22	0.45
1:A:271:CYS:O	1:A:283:ARG:HA	2.16	0.45
1:B:206:TRP:CH2	1:B:271:CYS:HB2	2.52	0.45
1:A:106:ARG:HH22	1:A:130:ASP:CG	2.25	0.45
1:B:76:LEU:HB2	1:B:87:LEU:HD11	1.99	0.45
1:A:74:TRP:CZ2	1:A:136:CYS:HB2	2.52	0.44
1:A:136:CYS:O	1:A:148:SER:HA	2.17	0.44
1:B:287:HIS:ND1	2:B:303:HOH:O	2.36	0.44
1:B:106:ARG:HH12	1:B:130:ASP:CG	2.25	0.44
1:B:209:GLN:HG2	1:B:218:ALA:HB2	2.00	0.44
1:A:63:ASP:OD1	1:A:64:ARG:N	2.52	0.43
1:B:53:CYS:SG	1:B:58:MET:HE1	2.57	0.43
1:B:55:SER:HB3	1:B:58:MET:HG3	2.01	0.43
1:B:227:SER:OG	1:B:229:GLU:OE1	2.35	0.43
1:A:134:TYR:CE1	1:A:183:MET:HE1	2.54	0.43
1:A:215:HIS:CG	1:A:216:ASP:H	2.37	0.42
1:A:74:TRP:CH2	1:A:136:CYS:HB2	2.54	0.42
1:B:166:TRP:CD1	1:B:168:GLY:H	2.37	0.42
1:B:74:TRP:CZ2	1:B:136:CYS:HB2	2.54	0.42
1:B:49:ALA:HB2	1:B:261:LEU:HD11	2.01	0.41

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	261/274 (95%)	249 (95%)	11 (4%)	1 (0%)	30	34
1	B	263/274 (96%)	255 (97%)	8 (3%)	0	100	100
All	All	524/548 (96%)	504 (96%)	19 (4%)	1 (0%)	43	51

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	200	ALA

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	227/233 (97%)	225 (99%)	2 (1%)	70	84
1	B	227/233 (97%)	227 (100%)	0	100	100
All	All	454/466 (97%)	452 (100%)	2 (0%)	84	92

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	197	LEU
1	A	259	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	141	HIS
1	A	289	GLN
1	B	115	HIS
1	B	201	GLN

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Mol	Chain	Res	Type
1	B	274	HIS
1	B	289	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 oligosaccharides 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	263/274 (95%)	1.08	52 (19%) 3 2	35, 60, 146, 187	0
1	B	265/274 (96%)	1.05	48 (18%) 3 2	34, 57, 127, 167	0
All	All	528/548 (96%)	1.07	100 (18%) 3 2	34, 59, 138, 187	0

All (100) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	197	LEU	6.8
1	B	294	ALA	6.3
1	A	65	LEU	6.3
1	B	60	TRP	5.8
1	A	293	PRO	5.4
1	A	176	ALA	5.2
1	B	237	PHE	5.2
1	B	197	LEU	5.2
1	B	31	ALA	5.1
1	A	200	ALA	5.0
1	B	196	HIS	4.9
1	A	160	LEU	4.7
1	B	236	PRO	4.5
1	A	294	ALA	4.5
1	B	80	PRO	4.2
1	B	293	PRO	4.1
1	A	237	PHE	4.0
1	B	239	ARG	4.0
1	A	66	HIS	4.0
1	A	161	LEU	3.9
1	A	80	PRO	3.9
1	A	67	ASP	3.9
1	B	213	VAL	3.8
1	B	216	ASP	3.7

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Mol	Chain	Res	Type	RSRZ
1	B	30	ALA	3.7
1	B	194	ASP	3.7
1	B	101	PRO	3.7
1	A	213	VAL	3.6
1	A	64	ARG	3.6
1	B	78	GLY	3.6
1	A	196	HIS	3.5
1	A	215	HIS	3.4
1	A	156	THR	3.3
1	A	63	ASP	3.3
1	B	61	THR	3.3
1	B	238	LEU	3.3
1	B	62	GLN	3.3
1	A	185	CYS	3.3
1	B	195	ARG	3.2
1	B	185	CYS	3.1
1	B	212	GLY	3.1
1	A	83	GLN	3.0
1	B	235	PRO	3.0
1	B	215	HIS	3.0
1	B	102	ARG	2.9
1	A	201	GLN	2.9
1	A	136	CYS	2.9
1	B	136	CYS	2.9
1	A	195	ARG	2.8
1	B	200	ALA	2.8
1	A	81	GLY	2.7
1	B	202	GLN	2.6
1	A	214	SER	2.6
1	A	262	GLU	2.6
1	A	126	VAL	2.6
1	A	100	GLU	2.6
1	A	217	ARG	2.6
1	A	32	SER	2.6
1	B	32	SER	2.6
1	A	61	THR	2.5
1	B	271	CYS	2.5
1	A	101	PRO	2.5
1	A	154	GLU	2.4
1	B	67	ASP	2.4
1	A	278	CYS	2.4
1	A	260	GLU	2.4

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Mol	Chain	Res	Type	RSRZ
1	B	272	HIS	2.3
1	B	83	GLN	2.3
1	B	199	GLU	2.3
1	B	292	GLU	2.3
1	A	159	PRO	2.3
1	A	162	SER	2.3
1	B	33	SER	2.3
1	A	174	VAL	2.3
1	A	53	CYS	2.3
1	A	155	VAL	2.2
1	B	273	LEU	2.2
1	A	84	ARG	2.2
1	B	217	ARG	2.2
1	A	164	ALA	2.2
1	B	145	LEU	2.2
1	B	234	GLY	2.2
1	A	115	HIS	2.2
1	A	276	HIS	2.2
1	A	183	MET	2.2
1	A	128	ARG	2.1
1	B	35	LEU	2.1
1	B	111	PRO	2.1
1	B	115	HIS	2.1
1	A	188	ARG	2.1
1	A	82	SER	2.0
1	A	198	GLU	2.0
1	A	216	ASP	2.0
1	B	158	ASP	2.0
1	B	240	ASP	2.0
1	B	211	PRO	2.0
1	B	126	VAL	2.0
1	B	79	GLY	2.0
1	A	60	TRP	2.0
1	A	194	ASP	2.0

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 [i](#)

There are no oligosaccharides 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.