



Full wwPDB X-ray Structure Validation Report ⓘ

Sep 21, 2020 – 08:06 AM EDT

PDB ID : 6V02
Title : N-terminal 5 domains of CI-MPR
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Deposited on : 2019-11-18
Resolution : 2.46 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
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtrriage (Phenix) : 1.13
EDS : 2.14.6
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) : 2.14.6

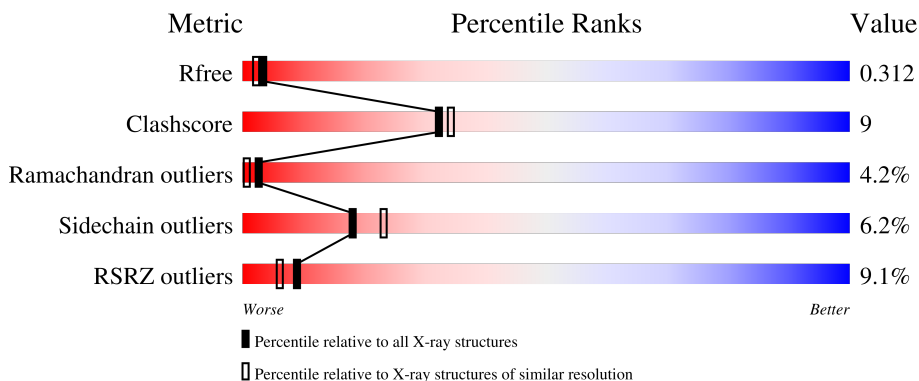
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.46 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	1544 (2.48-2.44)
Clashscore	141614	1613 (2.48-2.44)
Ramachandran outliers	138981	1598 (2.48-2.44)
Sidechain outliers	138945	1598 (2.48-2.44)
RSRZ outliers	127900	1523 (2.48-2.44)

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	731	

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 4570 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 Cation-independent mannose-6-phosphate receptor.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	573	4482	2819	756	872	35	0	0	0

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	3	GLY	-	expression tag	UNP P11717
A	4	SER	-	expression tag	UNP P11717
A	5	THR	-	expression tag	UNP P11717
A	6	GLN	-	expression tag	UNP P11717
A	7	ALA	-	expression tag	UNP P11717
A	729	ALA	-	expression tag	UNP P11717
A	730	LEU	-	expression tag	UNP P11717
A	731	VAL	-	expression tag	UNP P11717
A	732	PRO	-	expression tag	UNP P11717
A	733	ARG	-	expression tag	UNP P11717

- Molecule 2 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: C₈H₁₅NO₆).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
2	A	1	14	8	1	5	0	0

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
3	A	74	74	74	0	0

4 Data and refinement statistics i

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	50.78Å 66.22Å 124.53Å 90.00° 100.53° 90.00°	Depositor
Resolution (Å)	35.91 – 2.46 122.43 – 2.46	Depositor EDS
% Data completeness (in resolution range)	66.0 (35.91-2.46) 66.1 (122.43-2.46)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.47 (at 2.45Å)	Xtrriage
Refinement program	REFMAC 5.8.0258	Depositor
R, R_{free}	0.240 , 0.308 0.248 , 0.312	Depositor DCC
R_{free} test set	996 reflections (5.08%)	wwPDB-VP
Wilson B-factor (Å ²)	63.5	Xtrriage
Anisotropy	0.059	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 62.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	0.017 for h,-k,-h-l	Xtrriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	4570	wwPDB-VP
Average B, all atoms (Å ²)	76.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.49% 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](#)

Bond lengths and bond angles in the following residue types are not validated in this section: NAG

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	0.36	0/4574	0.65	0/6191

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	4482	0	4292	77	0
2	A	14	0	13	0	0
3	A	74	0	0	0	0
All	All	4570	0	4305	77	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 9.

All (77) 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:13:LEU:HB2	1:A:33:ILE:HD11	1.79	0.65

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:362:ARG:HB2	1:A:381:GLY:HA3	1.82	0.62
1:A:650:ASP:O	1:A:651:GLU:HB2	1.99	0.62
1:A:92:GLN:NE2	1:A:94:SER:OG	2.33	0.61
1:A:670:ILE:HB	1:A:694:PHE:HB2	1.81	0.61
1:A:590:GLU:HG3	1:A:591:ASN:H	1.70	0.57
1:A:252:VAL:HB	1:A:278:ILE:HD13	1.86	0.57
1:A:258:ARG:NH1	1:A:696:CYS:O	2.38	0.57
1:A:362:ARG:HB2	1:A:381:GLY:CA	2.34	0.56
1:A:243:HIS:ND1	1:A:711:ASP:OD2	2.34	0.56
1:A:328:LEU:HA	1:A:345:ALA:O	2.06	0.56
1:A:67:ARG:HD3	1:A:74:LEU:HD11	1.89	0.55
1:A:318:ILE:HG23	1:A:318:ILE:O	2.07	0.54
1:A:330:VAL:HG12	1:A:331:CYS:SG	2.47	0.54
1:A:8:ALA:HB1	1:A:10:PHE:CE2	2.42	0.54
1:A:711:ASP:HB3	1:A:713:SER:H	1.73	0.54
1:A:392:MET:HB2	1:A:420:THR:HG23	1.90	0.54
1:A:605:LEU:C	1:A:607:PRO:HD2	2.29	0.53
1:A:320:ASP:HA	1:A:325:LEU:HD12	1.89	0.53
1:A:590:GLU:CG	1:A:591:ASN:H	2.22	0.53
1:A:676:GLY:O	1:A:687:PRO:HB2	2.08	0.53
1:A:702:VAL:HG22	1:A:723:TYR:HE2	1.72	0.53
1:A:309:LEU:O	1:A:330:VAL:HG22	2.09	0.52
1:A:679:PRO:HA	1:A:686:THR:O	2.07	0.52
1:A:551:CYS:HB3	1:A:581:ALA:HB3	1.91	0.52
1:A:109:VAL:HG23	1:A:118:PHE:HA	1.92	0.51
1:A:63:ASP:OD2	1:A:65:VAL:HG22	2.11	0.51
1:A:414:THR:HG21	1:A:424:THR:HG23	1.93	0.51
1:A:307:THR:N	1:A:308:PRO:CD	2.75	0.50
1:A:551:CYS:HB3	1:A:582:CYS:H	1.76	0.50
1:A:108:PHE:HA	1:A:118:PHE:CD1	2.47	0.49
1:A:447:LYS:HB3	1:A:583:VAL:HG12	1.94	0.49
1:A:606:SER:N	1:A:607:PRO:HD2	2.28	0.49
1:A:444:ASP:O	1:A:446:LYS:N	2.46	0.48
1:A:73:LEU:HD13	1:A:417:VAL:HG23	1.94	0.48
1:A:385:CYS:O	1:A:387:SER:O	2.31	0.48
1:A:152:ASN:N	1:A:153:PRO:CD	2.76	0.48
1:A:636:PRO:HB2	1:A:653:THR:HG21	1.96	0.47
1:A:548:THR:C	1:A:549:LEU:HD23	2.34	0.47
1:A:55:THR:O	1:A:57:THR:HG22	2.14	0.47
1:A:692:ILE:HG22	1:A:694:PHE:CE1	2.50	0.47
1:A:709:GLU:O	1:A:709:GLU:HG2	2.16	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:652:LYS:O	1:A:654:TRP:CZ3	2.69	0.46
1:A:609:THR:HG23	1:A:630:GLY:H	1.81	0.46
1:A:27:VAL:HG13	1:A:52:ASP:N	2.30	0.46
1:A:244:SER:O	1:A:272:ARG:NH1	2.48	0.45
1:A:217:LEU:HD11	1:A:225:LEU:HB3	1.98	0.45
1:A:683:GLU:HA	1:A:683:GLU:OE1	2.16	0.45
1:A:147:ARG:O	1:A:148:LYS:HB3	2.16	0.45
1:A:128:LYS:HA	1:A:128:LYS:HE3	1.99	0.44
1:A:595:PHE:HA	1:A:602:SER:HB3	1.99	0.44
1:A:646:VAL:HG22	1:A:653:THR:HG22	1.98	0.44
1:A:196:GLY:O	1:A:212:GLN:HG2	2.17	0.44
1:A:142:PHE:CE1	1:A:148:LYS:HB2	2.52	0.44
1:A:29:TYR:HA	1:A:49:CYS:O	2.17	0.44
1:A:225:LEU:HB2	1:A:251:PHE:HB2	2.00	0.44
1:A:121:ARG:NH2	1:A:397:PHE:O	2.51	0.43
1:A:365:ASN:HB3	1:A:380:PHE:HB2	2.00	0.43
1:A:640:ASP:HB3	1:A:658:LEU:HD23	2.01	0.43
1:A:28:LEU:HD13	1:A:146:LEU:HD22	2.00	0.43
1:A:78:THR:CG2	1:A:91:VAL:O	2.67	0.43
1:A:549:LEU:HD22	1:A:576:TRP:HB3	2.00	0.42
1:A:620:LYS:O	1:A:621:LYS:HB2	2.19	0.42
1:A:129:ASP:OD1	1:A:129:ASP:N	2.53	0.42
1:A:262:ILE:HB	1:A:263:PRO:HD2	2.01	0.42
1:A:579:ALA:HB1	1:A:598:GLN:O	2.20	0.42
1:A:629:CYS:HA	1:A:660:ASN:O	2.20	0.42
1:A:65:VAL:HG23	1:A:66:LEU:HG	2.01	0.41
1:A:702:VAL:HG22	1:A:723:TYR:CE2	2.54	0.41
1:A:632:VAL:HG12	1:A:641:SER:O	2.21	0.41
1:A:184:ARG:O	1:A:185:ASP:HB2	2.20	0.41
1:A:51:HIS:O	1:A:52:ASP:HB3	2.21	0.40
1:A:78:THR:HG22	1:A:91:VAL:O	2.21	0.40
1:A:317:TYR:O	1:A:327:TYR:HA	2.21	0.40
1:A:345:ALA:HB2	1:A:362:ARG:O	2.21	0.40
1:A:589:GLY:HA3	1:A:593:THR:O	2.22	0.40
1:A:258:ARG:HH21	1:A:278:ILE:HD11	1.86	0.40

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	549/731 (75%)	457 (83%)	69 (13%)	23 (4%)	3 1

All (23) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	322	LYS
1	A	330	VAL
1	A	621	LYS
1	A	711	ASP
1	A	233	GLU
1	A	342	LYS
1	A	362	ARG
1	A	381	GLY
1	A	382	GLY
1	A	445	GLY
1	A	651	GLU
1	A	676	GLY
1	A	685	HIS
1	A	148	LYS
1	A	343	GLN
1	A	363	TYR
1	A	613	GLY
1	A	185	ASP
1	A	344	ALA
1	A	583	VAL
1	A	54	LYS
1	A	82	CYS
1	A	553	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	499/628 (80%)	468 (94%)	31 (6%)	18 23

All (31) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	26	ASN
1	A	28	LEU
1	A	52	ASP
1	A	63	ASP
1	A	70	THR
1	A	78	THR
1	A	88	ASN
1	A	121	ARG
1	A	128	LYS
1	A	129	ASP
1	A	139	CYS
1	A	157	LEU
1	A	225	LEU
1	A	241	ASP
1	A	262	ILE
1	A	342	LYS
1	A	363	TYR
1	A	365	ASN
1	A	387	SER
1	A	410	THR
1	A	427	THR
1	A	548	THR
1	A	592	CYS
1	A	602	SER
1	A	608	LEU
1	A	635	SER
1	A	651	GLU
1	A	652	LYS
1	A	662	LYS
1	A	678	THR

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Mol	Chain	Res	Type
1	A	709	GLU

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

Mol	Chain	Res	Type
1	A	270	ASN
1	A	390	GLN
1	A	396	ASN
1	A	591	ASN
1	A	612	ASN
1	A	645	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](#)

1 ligand is modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
2	NAG	A	801	1	14,14,15	0.38	0	17,19,21	0.84	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	A	801	1	-	1/6/23/26	0/1/1/1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	801	NAG	O5-C5-C6-O6

There are no ring outliers.

No monomer is involved in short contacts.

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	573/731 (78%)	0.83	52 (9%) 9 6	36, 74, 112, 139	0

All (52) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	306	LEU	9.8
1	A	439	LEU	7.5
1	A	317	TYR	5.2
1	A	378	ILE	4.8
1	A	328	LEU	4.2
1	A	451	LEU	4.2
1	A	8	ALA	4.1
1	A	377	LEU	4.1
1	A	288	LEU	4.0
1	A	430	ALA	3.9
1	A	613	GLY	3.7
1	A	395	ILE	3.6
1	A	553	PRO	3.5
1	A	552	LYS	3.5
1	A	579	ALA	3.5
1	A	309	LEU	3.4
1	A	449	TYR	3.4
1	A	427	THR	3.3
1	A	10	PHE	3.1
1	A	344	ALA	3.1
1	A	40	VAL	3.0
1	A	341	LYS	3.0
1	A	556	LEU	3.0
1	A	380	PHE	2.9
1	A	453	ALA	2.9
1	A	128	LYS	2.8
1	A	331	CYS	2.8

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Mol	Chain	Res	Type	RSRZ
1	A	440	CYS	2.8
1	A	364	HIS	2.7
1	A	576	TRP	2.7
1	A	548	THR	2.6
1	A	342	LYS	2.6
1	A	682	ASN	2.6
1	A	345	ALA	2.5
1	A	53	LEU	2.4
1	A	605	LEU	2.4
1	A	56	ARG	2.4
1	A	555	ASP	2.4
1	A	402	THR	2.3
1	A	376	THR	2.3
1	A	233	GLU	2.3
1	A	397	PHE	2.2
1	A	28	LEU	2.2
1	A	295	LEU	2.2
1	A	601	PHE	2.1
1	A	305	ASP	2.1
1	A	425	TRP	2.1
1	A	379	TYR	2.1
1	A	293	CYS	2.1
1	A	45	SER	2.0
1	A	428	GLU	2.0
1	A	595	PHE	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](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q < 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
2	NAG	A	801	14/15	0.79	0.22	84,92,96,99	0

6.5 Other polymers [i](#)

There are no such residues in this entry.