



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 9, 2026 – 10:02 AM UTC

PDB ID : 6G52 / pdb_00006g52
Title : CRYSTAL STRUCTURE OF THE CNMP BINDING DOMAIN OF THE MAGNESIUM TRANSPORTER CNNM4
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Deposited on : 2018-03-28
Resolution : 3.69 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 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
Mogul	:	2022.3.0, CSD as543be (2022)
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

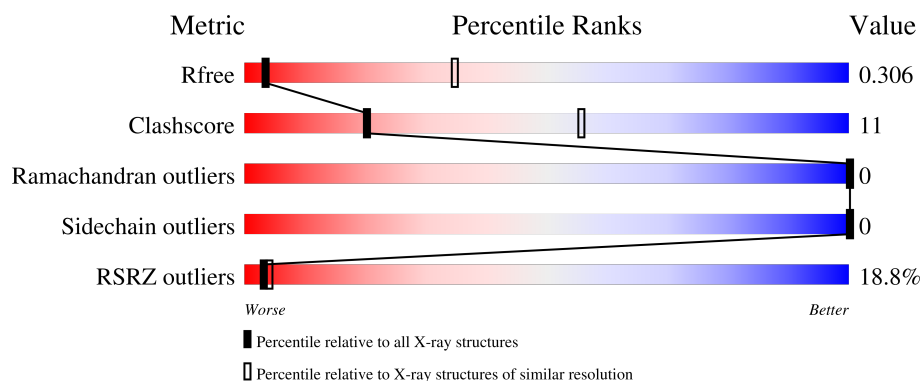
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.69 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.



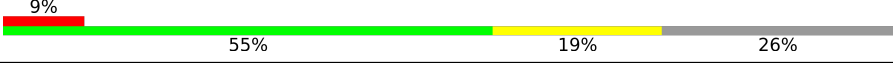
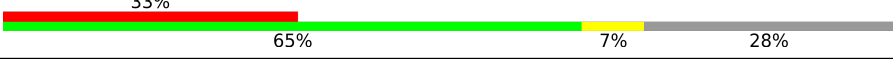
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	1131 (3.80-3.60)
Clashscore	190562	1171 (3.80-3.60)
Ramachandran outliers	187476	1129 (3.80-3.60)
Sidechain outliers	187428	1126 (3.80-3.60)
RSRZ outliers	180081	1130 (3.80-3.60)

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	189	7% 53% 20% 27%
1	B	189	11% 66% 14% 21%
1	C	189	16% 49% 23% 28%
1	D	189	10% 60% 12% 28%
1	E	189	11% 56% 17% 27%

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Mol	Chain	Length	Quality of chain
1	F	189	
1	G	189	
1	H	189	
1	I	189	

2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 9252 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 Metal transporter CNNM4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	I	137	Total	C	N	O	Se	0	0	0
			870	558	145	164	3			
1	B	150	Total	C	N	O	Se	0	0	0
			1132	732	189	207	4			
1	C	136	Total	C	N	O	Se	0	0	0
			1016	660	167	186	3			
1	D	136	Total	C	N	O	Se	0	0	0
			986	642	157	184	3			
1	E	138	Total	C	N	O	Se	0	0	0
			1036	672	168	192	4			
1	F	136	Total	C	N	O	Se	0	0	0
			1054	685	175	191	3			
1	G	139	Total	C	N	O	Se	0	0	0
			1051	677	179	191	4			
1	H	139	Total	C	N	O	Se	0	0	0
			1039	678	168	189	4			
1	A	138	Total	C	N	O	Se	0	0	0
			1068	692	175	197	4			

There are 27 discrepancies between the modelled and reference sequences:

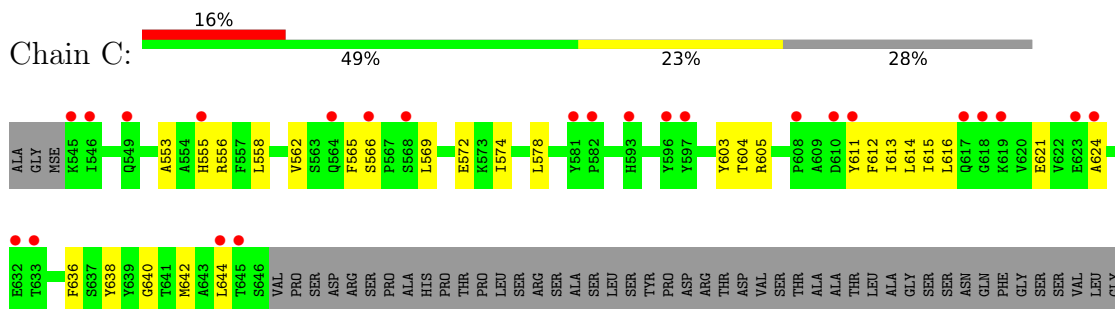
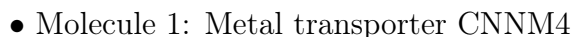
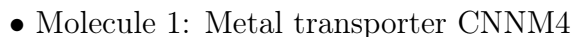
Chain	Residue	Modelled	Actual	Comment	Reference
I	542	ALA	-	expression tag	UNP Q6P4Q7
I	543	GLY	-	expression tag	UNP Q6P4Q7
I	544	MSE	-	expression tag	UNP Q6P4Q7
B	542	ALA	-	expression tag	UNP Q6P4Q7
B	543	GLY	-	expression tag	UNP Q6P4Q7
B	544	MSE	-	expression tag	UNP Q6P4Q7
C	542	ALA	-	expression tag	UNP Q6P4Q7
C	543	GLY	-	expression tag	UNP Q6P4Q7
C	544	MSE	-	expression tag	UNP Q6P4Q7
D	542	ALA	-	expression tag	UNP Q6P4Q7
D	543	GLY	-	expression tag	UNP Q6P4Q7

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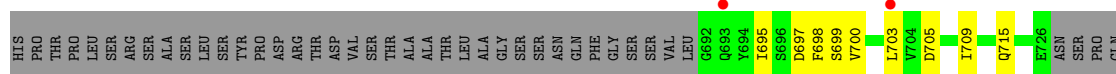
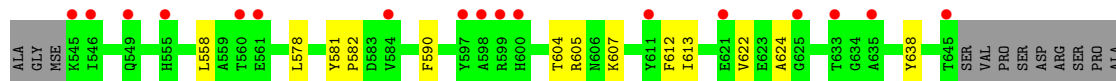
Chain	Residue	Modelled	Actual	Comment	Reference
D	544	MSE	-	expression tag	UNP Q6P4Q7
E	542	ALA	-	expression tag	UNP Q6P4Q7
E	543	GLY	-	expression tag	UNP Q6P4Q7
E	544	MSE	-	expression tag	UNP Q6P4Q7
F	542	ALA	-	expression tag	UNP Q6P4Q7
F	543	GLY	-	expression tag	UNP Q6P4Q7
F	544	MSE	-	expression tag	UNP Q6P4Q7
G	542	ALA	-	expression tag	UNP Q6P4Q7
G	543	GLY	-	expression tag	UNP Q6P4Q7
G	544	MSE	-	expression tag	UNP Q6P4Q7
H	542	ALA	-	expression tag	UNP Q6P4Q7
H	543	GLY	-	expression tag	UNP Q6P4Q7
H	544	MSE	-	expression tag	UNP Q6P4Q7
A	542	ALA	-	expression tag	UNP Q6P4Q7
A	543	GLY	-	expression tag	UNP Q6P4Q7
A	544	MSE	-	expression tag	UNP Q6P4Q7

- Molecule 1: Metal transporter CNNM4

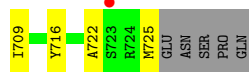
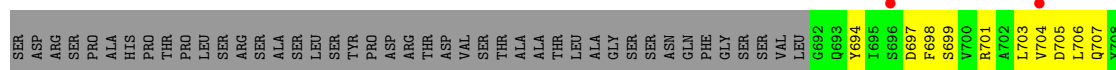




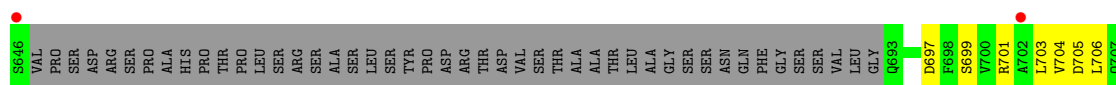
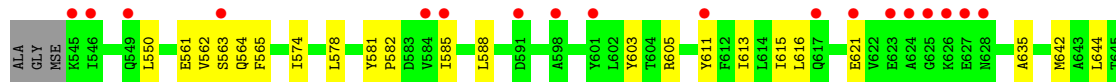
• Molecule 1: Metal transporter CNNM4



• Molecule 1: Metal transporter CNNM4

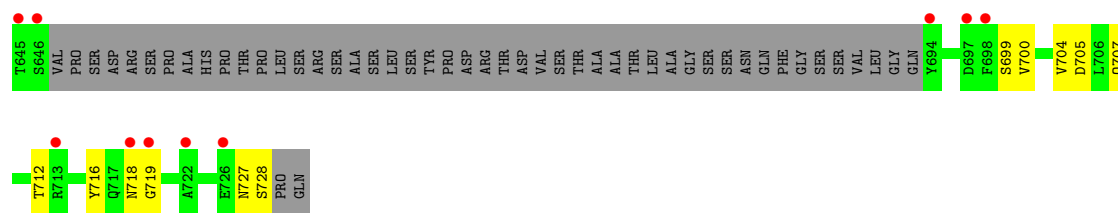


• Molecule 1: Metal transporter CNNM4

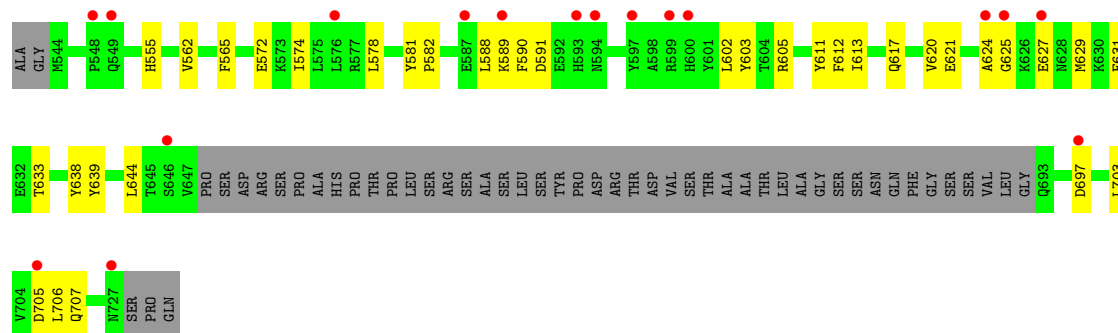


• Molecule 1: Metal transporter CNNM4

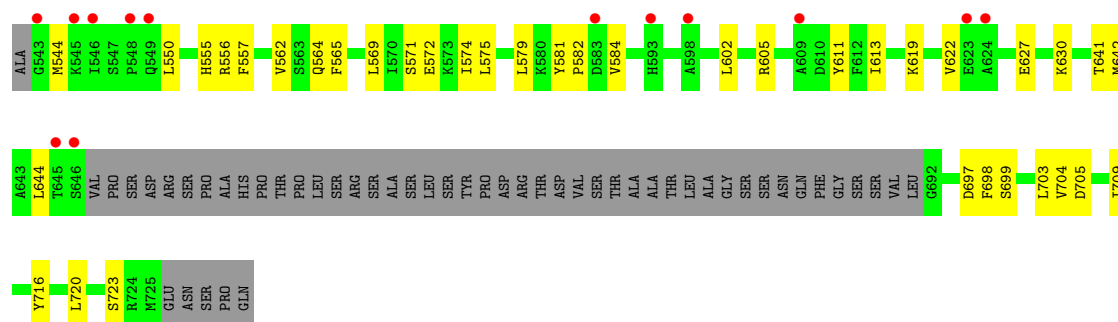




● Molecule 1: Metal transporter CNNM4



● Molecule 1: Metal transporter CNNM4



4 Data and refinement statistics

Property	Value	Source
Space group	P 32 2 1	Depositor
Cell constants a, b, c, α , β , γ	116.74Å 116.74Å 243.46Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	63.29 – 3.69 63.29 – 3.69	Depositor EDS
% Data completeness (in resolution range)	96.8 (63.29-3.69) 96.9 (63.29-3.69)	Depositor EDS
R_{merge}	0.18	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.18 (at 3.67Å)	Xtriage
Refinement program	PHENIX 1.10.1_2155	Depositor
R, R_{free}	0.284 , 0.303 0.285 , 0.306	Depositor DCC
R_{free} test set	1991 reflections (9.32%)	wwPDB-VP
Wilson B-factor (Å ²)	41.9	Xtriage
Anisotropy	0.072	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 78.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.036 for -h,-k,l	Xtriage
F_o, F_c correlation	0.79	EDS
Total number of atoms	9252	wwPDB-VP
Average B, all atoms (Å ²)	100.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.48% 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	0.22	0/1087	0.46	0/1466
1	B	0.12	0/1151	0.37	0/1554
1	C	0.18	0/1034	0.47	0/1401
1	D	0.12	0/1004	0.36	0/1363
1	E	0.14	0/1054	0.41	0/1423
1	F	0.18	0/1074	0.49	0/1453
1	G	0.17	0/1069	0.47	0/1444
1	H	0.15	0/1059	0.42	0/1435
1	I	0.14	0/881	0.46	0/1202
All	All	0.16	0/9413	0.44	0/12741

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	1068	0	1008	29	0
1	B	1132	0	1050	19	0
1	C	1016	0	935	33	0
1	D	986	0	864	14	0
1	E	1036	0	955	24	0
1	F	1054	0	993	27	0
1	G	1051	0	969	30	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	H	1039	0	947	24	0
1	I	870	0	664	10	0
All	All	9252	0	8385	199	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 11.

The worst 5 of 199 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:F:616:LEU:HD11	1:F:709:ILE:HG23	1.56	0.86
1:C:612:PHE:HE1	1:C:638:TYR:HB2	1.41	0.86
1:C:616:LEU:HD11	1:C:709:ILE:HG23	1.58	0.85
1:C:624:ALA:HB2	1:C:698:PHE:HA	1.62	0.81
1:A:555:HIS:HE1	1:A:572:GLU:HG3	1.47	0.79

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	134/189 (71%)	134 (100%)	0	0	100	100
1	B	146/189 (77%)	142 (97%)	4 (3%)	0	100	100
1	C	132/189 (70%)	130 (98%)	2 (2%)	0	100	100
1	D	132/189 (70%)	132 (100%)	0	0	100	100
1	E	134/189 (71%)	134 (100%)	0	0	100	100
1	F	132/189 (70%)	132 (100%)	0	0	100	100
1	G	135/189 (71%)	130 (96%)	5 (4%)	0	100	100
1	H	135/189 (71%)	135 (100%)	0	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	I	133/189 (70%)	132 (99%)	1 (1%)	0	100	100
All	All	1213/1701 (71%)	1201 (99%)	12 (1%)	0	100	100

There are no Ramachandran outliers to report.

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	105/160 (66%)	105 (100%)	0	100	100
1	B	106/160 (66%)	106 (100%)	0	100	100
1	C	94/160 (59%)	94 (100%)	0	100	100
1	D	85/160 (53%)	85 (100%)	0	100	100
1	E	97/160 (61%)	97 (100%)	0	100	100
1	F	102/160 (64%)	102 (100%)	0	100	100
1	G	98/160 (61%)	98 (100%)	0	100	100
1	H	95/160 (59%)	95 (100%)	0	100	100
1	I	55/160 (34%)	55 (100%)	0	100	100
All	All	837/1440 (58%)	837 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 6 such sidechains are listed below:

Mol	Chain	Res	Type
1	F	715	GLN
1	H	617	GLN
1	H	707	GLN
1	D	564	GLN
1	B	564	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 [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	134/189 (70%)	1.15	13 (9%) 13 13	54, 89, 118, 143	0
1	B	146/189 (77%)	1.11	21 (14%) 6 8	47, 82, 130, 157	0
1	C	133/189 (70%)	1.48	30 (22%) 2 3	69, 112, 147, 159	0
1	D	133/189 (70%)	1.37	19 (14%) 6 8	75, 109, 139, 151	0
1	E	134/189 (70%)	1.20	20 (14%) 5 7	61, 95, 123, 169	0
1	F	133/189 (70%)	1.36	22 (16%) 4 6	67, 100, 129, 155	0
1	G	135/189 (71%)	1.28	24 (17%) 4 5	57, 93, 118, 138	0
1	H	135/189 (71%)	1.27	17 (12%) 8 9	64, 92, 129, 151	0
1	I	133/189 (70%)	2.17	63 (47%) 0 1	96, 133, 172, 189	0
All	All	1216/1701 (71%)	1.37	229 (18%) 3 4	47, 100, 143, 189	0

The worst 5 of 229 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	543	GLY	5.3
1	I	600	HIS	4.8
1	I	565	PHE	4.7
1	I	598	ALA	4.6
1	D	549	GLN	4.2

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 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.