



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 04:55 AM UTC

PDB ID : 5FM4 / pdb_00005fm4
Title : Structure of the C-terminally extended domain My4 of human myomesin
(space group P21)
Authors : Pernigo, S.; Steiner, R.A.
Deposited on : 2015-10-30
Resolution : 2.80 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:

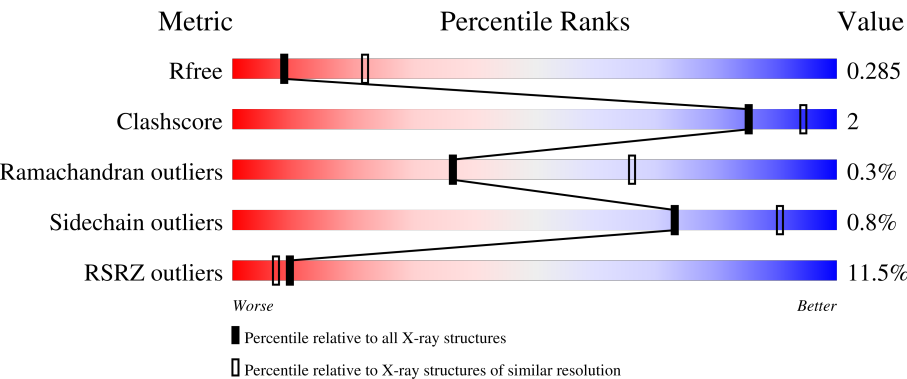
MolProbity	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)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

1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.80 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	3866 (2.80-2.80)
Clashscore	190562	4276 (2.80-2.80)
Ramachandran outliers	187476	4196 (2.80-2.80)
Sidechain outliers	187428	4198 (2.80-2.80)
RSRZ outliers	180081	3869 (2.80-2.80)

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	112	9% 82% 8% 10%
1	B	112	16% 91%
1	C	112	7% 86% 7% 6%
1	D	112	5% 83% 6% 10%
1	E	112	12% 83% 5% 10%

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Mol	Chain	Length	Quality of chain
1	F	112	13% 82% 8% 10%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 9491 atoms, of which 4728 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 MYOMESIN-1.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	101	Total	C	H	N	O	S	0	0	0
			1539	495	768	129	143	4			
1	B	108	Total	C	H	N	O	S	0	0	0
			1662	530	834	141	153	4			
1	C	105	Total	C	H	N	O	S	0	0	0
			1636	523	822	138	149	4			
1	D	101	Total	C	H	N	O	S	0	0	0
			1539	495	768	129	143	4			
1	E	101	Total	C	H	N	O	S	0	0	0
			1539	495	768	129	143	4			
1	F	101	Total	C	H	N	O	S	0	0	0
			1539	495	768	129	143	4			

There are 18 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	507	GLY	-	expression tag	UNP P52179
A	508	SER	-	expression tag	UNP P52179
A	509	THR	-	expression tag	UNP P52179
B	507	GLY	-	expression tag	UNP P52179
B	508	SER	-	expression tag	UNP P52179
B	509	THR	-	expression tag	UNP P52179
C	507	GLY	-	expression tag	UNP P52179
C	508	SER	-	expression tag	UNP P52179
C	509	THR	-	expression tag	UNP P52179
D	507	GLY	-	expression tag	UNP P52179
D	508	SER	-	expression tag	UNP P52179
D	509	THR	-	expression tag	UNP P52179
E	507	GLY	-	expression tag	UNP P52179
E	508	SER	-	expression tag	UNP P52179
E	509	THR	-	expression tag	UNP P52179
F	507	GLY	-	expression tag	UNP P52179
F	508	SER	-	expression tag	UNP P52179

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Chain	Residue	Modelled	Actual	Comment	Reference
F	509	THR	-	expression tag	UNP P52179

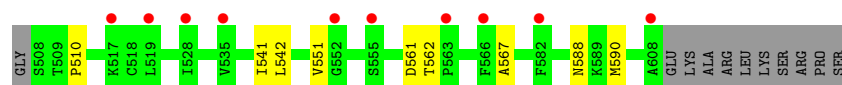
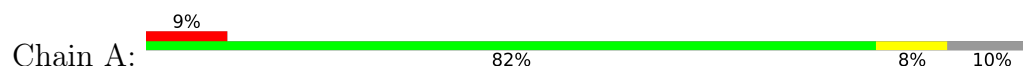
- Molecule 2 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	6	Total O 6 6	0	0
2	B	9	Total O 9 9	0	0
2	C	3	Total O 3 3	0	0
2	D	8	Total O 8 8	0	0
2	E	6	Total O 6 6	0	0
2	F	5	Total O 5 5	0	0

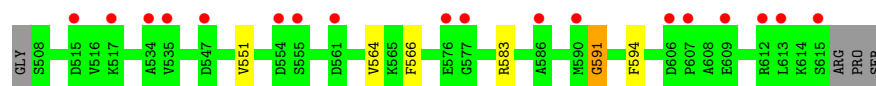
3 Residue-property plots [i](#)

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.

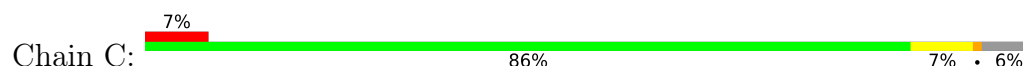
- Molecule 1: MYOMESIN-1



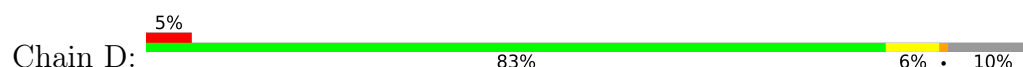
- Molecule 1: MYOMESIN-1



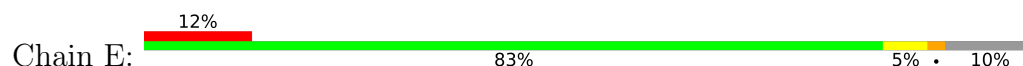
- Molecule 1: MYOMESIN-1



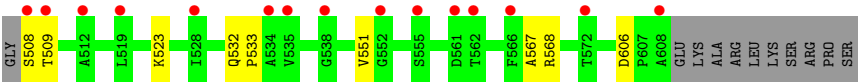
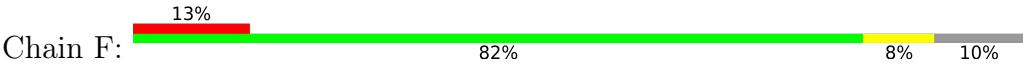
- Molecule 1: MYOMESIN-1



- Molecule 1: MYOMESIN-1



- Molecule 1: MYOMESIN-1



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	43.53Å 156.84Å 48.26Å 90.00° 94.38° 90.00°	Depositor
Resolution (Å)	39.21 – 2.80 39.21 – 2.80	Depositor EDS
% Data completeness (in resolution range)	95.2 (39.21-2.80) 95.1 (39.21-2.80)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.16 (at 2.81Å)	Xtriage
Refinement program	PHENIX (PHENIX.REFINE)	Depositor
R, R_{free}	0.261 , 0.287 0.263 , 0.285	Depositor DCC
R_{free} test set	736 reflections (4.86%)	wwPDB-VP
Wilson B-factor (Å ²)	38.8	Xtriage
Anisotropy	0.437	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 36.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.87	EDS
Total number of atoms	9491	wwPDB-VP
Average B, all atoms (Å ²)	35.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.06% 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

5.1 Standard geometry

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	0/791	0.75	2/1077 (0.2%)
1	B	0.40	0/848	0.78	2/1151 (0.2%)
1	C	0.40	0/833	0.77	1/1130 (0.1%)
1	D	0.39	0/791	0.78	2/1077 (0.2%)
1	E	0.34	0/791	0.69	0/1077
1	F	0.37	0/791	0.78	1/1077 (0.1%)
All	All	0.38	0/4845	0.76	8/6589 (0.1%)

There are no bond length outliers.

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	F	551	VAL	N-CA-C	6.70	117.45	110.62
1	C	551	VAL	N-CA-C	6.21	116.96	110.62
1	B	551	VAL	N-CA-C	6.01	116.75	110.62
1	D	566	PHE	N-CA-C	5.75	123.04	110.80
1	A	551	VAL	N-CA-C	5.25	117.61	111.05
1	A	567	ALA	N-CA-C	5.12	118.66	112.93
1	B	591	GLY	N-CA-C	5.09	117.91	110.63
1	D	567	ALA	N-CA-C	5.05	121.55	110.80

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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	771	768	768	5	0
1	B	828	834	834	4	0
1	C	814	822	822	4	1
1	D	771	768	768	5	0
1	E	771	768	768	4	1
1	F	771	768	768	4	0
2	A	6	0	0	0	0
2	B	9	0	0	0	0
2	C	3	0	0	0	0
2	D	8	0	0	0	0
2	E	6	0	0	0	0
2	F	5	0	0	0	0
All	All	4763	4728	4728	21	1

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 2.

All (21) 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:523:LYS:NZ	1:F:606:ASP:OD2	2.19	0.73
1:E:522:ASN:OD1	1:F:568:ARG:NH2	2.32	0.62
1:D:530:TRP:CE2	1:D:567:ALA:HA	2.43	0.54
1:E:567:ALA:O	1:E:568:ARG:NH1	2.43	0.52
1:A:561:ASP:OD1	1:B:583:ARG:NH1	2.44	0.50
1:A:562:THR:HG21	1:B:594:PHE:CD1	2.48	0.48
1:D:523:LYS:HB2	1:D:576:GLU:HG3	1.94	0.48
1:A:510:PRO:HB3	1:A:541:ILE:HD11	1.96	0.48
1:D:547:ASP:HB2	1:D:583:ARG:HG2	1.96	0.48
1:C:527:ILE:HG12	1:C:570:PRO:HB3	1.98	0.46
1:F:532:GLN:HG3	1:F:533:PRO:HD2	1.96	0.46
1:C:510:PRO:HG3	1:C:588:ASN:HD22	1.81	0.46
1:F:508:SER:OG	1:F:509:THR:N	2.47	0.45
1:C:561:ASP:OD1	1:C:561:ASP:N	2.37	0.44
1:E:547:ASP:HB2	1:E:583:ARG:HG2	2.00	0.44
1:A:542:LEU:HD22	1:B:591:GLY:HA2	2.00	0.43
1:B:564:VAL:HG22	1:B:566:PHE:H	1.84	0.43
1:D:530:TRP:CZ2	1:D:567:ALA:HA	2.54	0.43
1:A:588:ASN:OD1	1:A:590:MET:N	2.47	0.41
1:C:510:PRO:HB3	1:C:541:ILE:HD11	2.03	0.41
1:D:551:VAL:CG2	1:E:577:GLY:HA3	2.51	0.41

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:519:LEU:O	1:E:539:SER:OG[2_647]	2.04	0.16

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	99/112 (88%)	97 (98%)	2 (2%)	0	100	100
1	B	106/112 (95%)	103 (97%)	3 (3%)	0	100	100
1	C	101/112 (90%)	98 (97%)	3 (3%)	0	100	100
1	D	99/112 (88%)	95 (96%)	4 (4%)	0	100	100
1	E	99/112 (88%)	96 (97%)	2 (2%)	1 (1%)	12	38
1	F	99/112 (88%)	96 (97%)	2 (2%)	1 (1%)	12	38
All	All	603/672 (90%)	585 (97%)	16 (3%)	2 (0%)	36	66

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	F	567	ALA
1	E	567	ALA

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	84/93 (90%)	84 (100%)	0	100	100
1	B	90/93 (97%)	90 (100%)	0	100	100
1	C	89/93 (96%)	87 (98%)	2 (2%)	45	78
1	D	84/93 (90%)	84 (100%)	0	100	100
1	E	84/93 (90%)	82 (98%)	2 (2%)	43	77
1	F	84/93 (90%)	84 (100%)	0	100	100
All	All	515/558 (92%)	511 (99%)	4 (1%)	73	90

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	561	ASP
1	C	597	ARG
1	E	568	ARG
1	E	589	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	522	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

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	101/112 (90%)	1.00	10 (9%) 13 9	23, 31, 43, 50	0
1	B	108/112 (96%)	1.12	18 (16%) 4 3	23, 31, 52, 67	0
1	C	105/112 (93%)	1.07	8 (7%) 20 14	22, 32, 50, 56	0
1	D	101/112 (90%)	0.79	6 (5%) 28 21	22, 29, 40, 52	0
1	E	101/112 (90%)	1.08	14 (13%) 6 5	26, 37, 50, 62	0
1	F	101/112 (90%)	1.21	15 (14%) 5 4	31, 42, 66, 73	0
All	All	617/672 (91%)	1.05	71 (11%) 9 7	22, 33, 52, 73	0

All (71) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	613	LEU	4.5
1	C	576	GLU	4.3
1	A	555	SER	4.2
1	E	576	GLU	3.7
1	F	509	THR	3.6
1	F	555	SER	3.5
1	F	535	VAL	3.3
1	C	585	ARG	3.1
1	E	508	SER	3.0
1	C	607	PRO	3.0
1	B	554	ASP	3.0
1	A	566	PHE	3.0
1	A	535	VAL	2.9
1	D	608	ALA	2.9
1	A	608	ALA	2.8
1	E	608	ALA	2.8
1	B	515	ASP	2.8
1	F	534	ALA	2.8
1	B	577	GLY	2.7

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Mol	Chain	Res	Type	RSRZ
1	F	512	ALA	2.6
1	B	609	GLU	2.6
1	E	591	GLY	2.6
1	B	606	ASP	2.6
1	F	552	GLY	2.6
1	B	534	ALA	2.6
1	B	586	ALA	2.6
1	B	612	ARG	2.5
1	E	600	GLU	2.5
1	E	532	GLN	2.5
1	F	572	THR	2.5
1	B	561	ASP	2.5
1	F	538	GLY	2.5
1	B	615	SER	2.5
1	C	592	ILE	2.5
1	D	551	VAL	2.4
1	F	561	ASP	2.4
1	E	566	PHE	2.4
1	E	564	VAL	2.4
1	C	594	PHE	2.4
1	D	597	ARG	2.3
1	C	608	ALA	2.3
1	B	555	SER	2.3
1	F	508	SER	2.3
1	B	517	LYS	2.2
1	A	528	ILE	2.2
1	C	515	ASP	2.2
1	E	524	ASP	2.2
1	D	552	GLY	2.2
1	F	608	ALA	2.2
1	F	562	THR	2.2
1	F	528	ILE	2.1
1	B	547	ASP	2.1
1	A	519	LEU	2.1
1	A	582	PHE	2.1
1	E	529	SER	2.1
1	A	563	PRO	2.1
1	C	522	ASN	2.1
1	B	590	MET	2.1
1	E	514	LEU	2.1
1	A	552	GLY	2.1
1	D	561	ASP	2.1

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Mol	Chain	Res	Type	RSRZ
1	B	535	VAL	2.0
1	F	519	LEU	2.0
1	F	566	PHE	2.0
1	E	525	TYR	2.0
1	B	607	PRO	2.0
1	E	509	THR	2.0
1	E	534	ALA	2.0
1	A	517	LYS	2.0
1	B	576	GLU	2.0
1	D	600	GLU	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 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.