



wwPDB EM Validation Summary Report ⓘ

Nov 27, 2022 – 01:33 AM EST

PDB ID : 5TBY
EMDB ID : EMD-2240
Title : HUMAN BETA CARDIAC HEAVY MEROMYOSIN INTERACTING-HEADS MOTIF OBTAINED BY HOMOLOGY MODELING (USING SWISS-MODEL) OF HUMAN SEQUENCE FROM APHONOPELMA HOMOLOGY MODEL (PDB-3JBH), RIGIDLY FITTED TO HUMAN BETA-CARDIAC NEGATIVELY STAINED THICK FILAMENT 3D-RECONSTRUCTION (EMD-2240)
Authors : ALAMO, L.; WARE, J.S.; PINTO, A.; GILLILAN, R.E.; SEIDMAN, J.G.; SEIDMAN, C.E.; PADRON, R.
Deposited on : 2016-09-13
Resolution : 20.00 Å(reported)
Based on initial model : 3JBH

This is a wwPDB EM 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/EMValidationReportHelp>

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:

EMDB validation analysis : 0.0.1.dev43
MolProbity : 4.02b-467
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : **FAILED**
Ideal geometry (proteins) : Engh & Huber (2001)

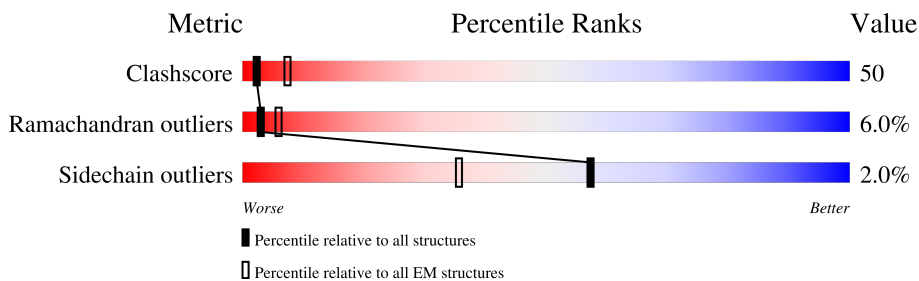
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 20.00 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)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the 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 $\leq 5\%$.

Mol	Chain	Length	Quality of chain
1	A	1935	25% 21% .. 51%
1	B	1935	20% 24% .. 51%
2	C	195	37% 38% .. 22%
2	D	195	38% 36% .. 22%
3	E	166	40% 46% 7% ..
3	F	166	44% 43% 8% ..

Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.31.2

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 20357 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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 Myosin-7.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	954	Total	C	N	O	S	0	0
			7704	4899	1324	1439	42		
1	B	950	Total	C	N	O	S	0	0
			7673	4877	1320	1435	41		

- Molecule 2 is a protein called Myosin light chain 3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	C	152	Total	C	N	O	S	0	0
			1212	759	202	240	11		
2	D	152	Total	C	N	O	S	0	0
			1212	759	202	240	11		

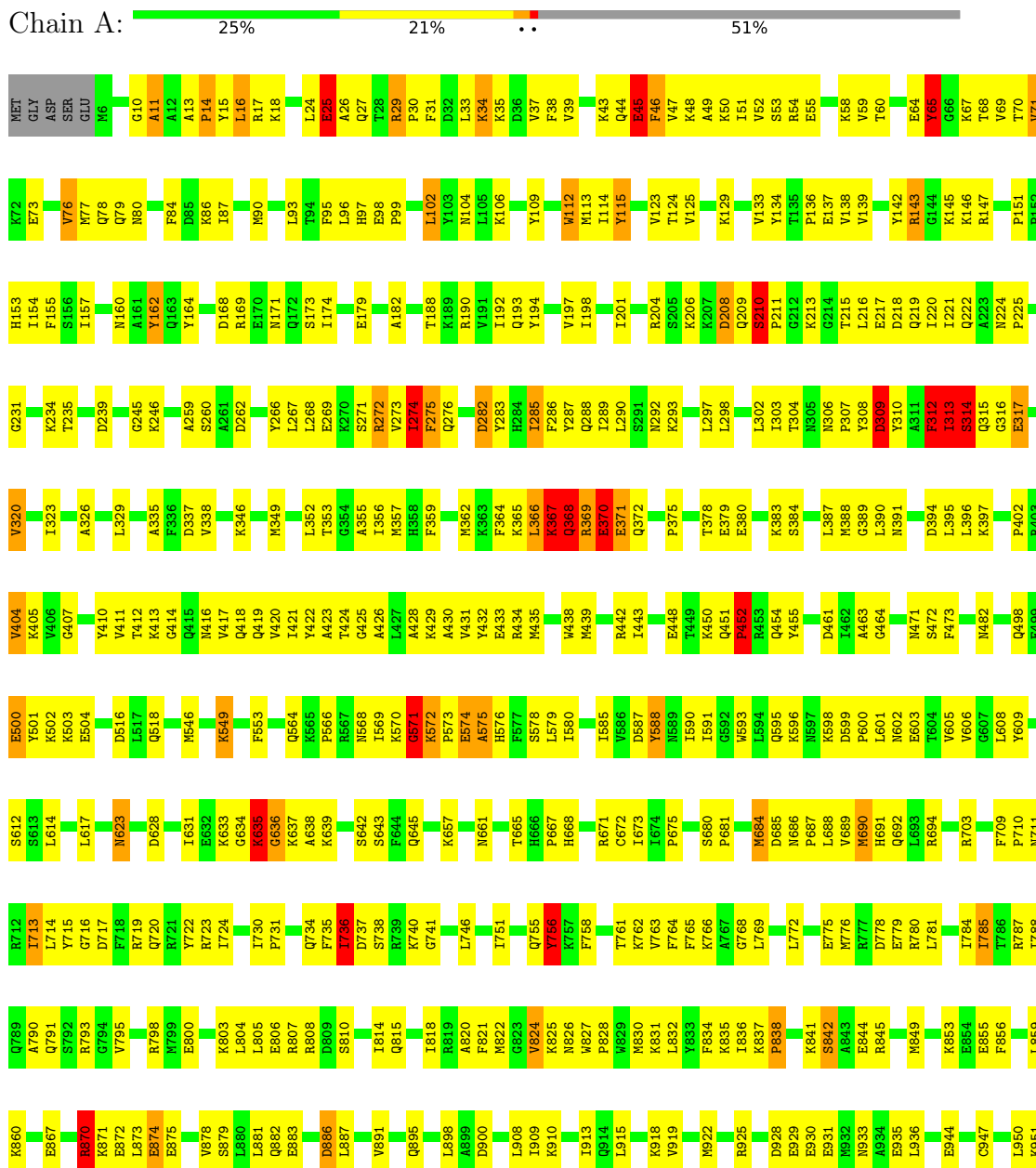
- Molecule 3 is a protein called Myosin regulatory light chain 2, ventricular/cardiac muscle isoform.

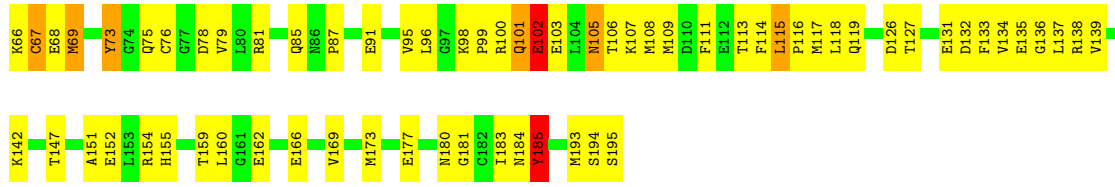
Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	E	160	Total	C	N	O	S	0	0
			1278	808	212	252	6		
3	F	160	Total	C	N	O	S	0	0
			1278	808	212	252	6		

3 Residue-property plots [i](#)

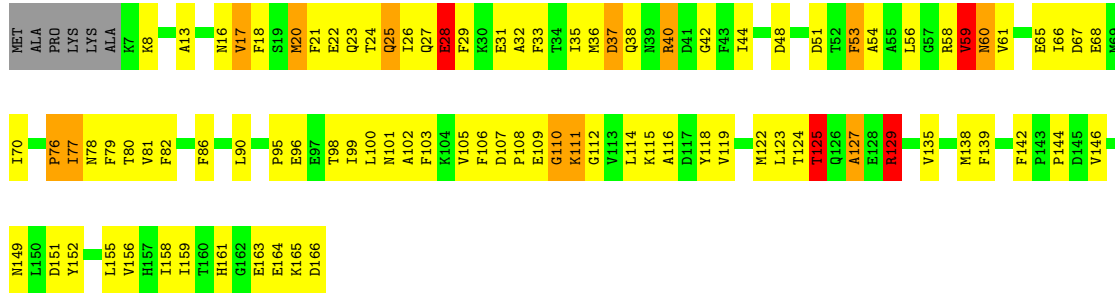
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded 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. 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: Myosin-7

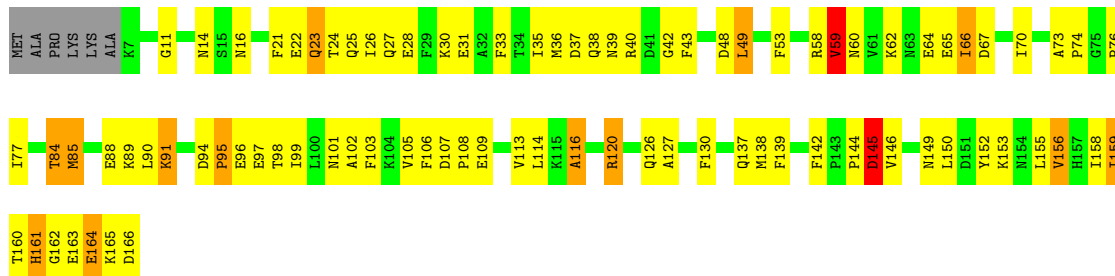




• Molecule 3: Myosin regulatory light chain 2, ventricular/cardiac muscle isoform



• Molecule 3: Myosin regulatory light chain 2, ventricular/cardiac muscle isoform



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C4	Depositor
Number of particles used	10700	Depositor
Resolution determination method	FSC 0.5 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI/PHILIPS CM120T	Depositor
Voltage (kV)	120	Depositor
Electron dose ($e^-/\text{\AA}^2$)	9	Depositor
Minimum defocus (nm)	1950	Depositor
Maximum defocus (nm)	1950	Depositor
Magnification	35000	Depositor
Image detector	KODAK SO-163 FILM	Depositor

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	0.61	3/7851 (0.0%)	1.11	54/10556 (0.5%)
1	B	0.62	1/7819 (0.0%)	1.11	48/10513 (0.5%)
2	C	0.60	0/1231	1.05	2/1651 (0.1%)
2	D	0.78	4/1231 (0.3%)	1.13	9/1651 (0.5%)
3	E	0.89	3/1301 (0.2%)	1.25	8/1747 (0.5%)
3	F	0.60	0/1301	1.15	6/1747 (0.3%)
All	All	0.65	11/20734 (0.1%)	1.12	127/27865 (0.5%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	20
1	B	0	19
2	C	0	2
3	E	0	3
3	F	0	4
All	All	0	48

The worst 5 of 11 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	E	129	ARG	CZ-NH1	-19.60	1.07	1.33
2	D	101	GLN	C-O	-10.93	1.02	1.23
3	E	129	ARG	NE-CZ	9.37	1.45	1.33
3	E	129	ARG	CZ-NH2	9.25	1.45	1.33
1	A	112	TRP	CG-CD1	-8.76	1.24	1.36

The worst 5 of 127 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	E	129	ARG	NE-CZ-NH2	-25.59	107.50	120.30
1	A	756	TYR	CZ-CE2-CD2	15.78	134.00	119.80
1	B	641	GLY	CA-C-O	-13.49	96.31	120.60
3	F	120	ARG	NE-CZ-NH1	12.91	126.76	120.30
1	B	102	LEU	CB-CG-CD2	-12.58	89.62	111.00

There are no chirality outliers.

5 of 48 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	115	TYR	Sidechain
1	A	15	TYR	Sidechain
1	A	162	TYR	Sidechain
1	A	25	GLU	Mainchain
1	A	45	GLU	Mainchain

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	7704	0	7735	681	0
1	B	7673	0	7706	1064	0
2	C	1212	0	1182	120	0
2	D	1212	0	1183	234	0
3	E	1278	0	1241	179	0
3	F	1278	0	1239	234	0
All	All	20357	0	20286	2030	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 50.

The worst 5 of 2030 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:B:804:LEU:CD2	2:D:63:ARG:HD3	1.21	1.56
1:A:714:LEU:HD21	1:B:396:LEU:CD1	1.15	1.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:831:LYS:HD3	3:F:163:GLU:CG	1.34	1.55
3:E:8:LYS:CD	3:F:59:VAL:HA	1.33	1.54
1:A:714:LEU:CD2	1:B:396:LEU:HD12	1.33	1.53

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 PDB entries followed by that with respect to all EM entries.

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	952/1935 (49%)	759 (80%)	141 (15%)	52 (6%)	2	19
1	B	948/1935 (49%)	781 (82%)	111 (12%)	56 (6%)	1	17
2	C	150/195 (77%)	132 (88%)	12 (8%)	6 (4%)	3	23
2	D	150/195 (77%)	133 (89%)	12 (8%)	5 (3%)	4	26
3	E	158/166 (95%)	111 (70%)	32 (20%)	15 (10%)	0	10
3	F	158/166 (95%)	115 (73%)	27 (17%)	16 (10%)	0	9
All	All	2516/4592 (55%)	2031 (81%)	335 (13%)	150 (6%)	3	17

5 of 150 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	11	ALA
1	A	27	GLN
1	A	208	ASP
1	A	272	ARG
1	A	313	ILE

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 PDB entries followed by that with respect to all EM entries.

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	831/1695 (49%)	811 (98%)	20 (2%)	49	69
1	B	828/1695 (49%)	811 (98%)	17 (2%)	53	72
2	C	133/167 (80%)	132 (99%)	1 (1%)	81	89
2	D	133/167 (80%)	132 (99%)	1 (1%)	81	89
3	E	137/141 (97%)	135 (98%)	2 (2%)	65	80
3	F	137/141 (97%)	133 (97%)	4 (3%)	42	64
All	All	2199/4006 (55%)	2154 (98%)	45 (2%)	57	74

5 of 45 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	640	LYS
1	B	861	GLU
1	B	706	ARG
1	B	793	ARG
2	C	185	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 44 such sidechains are listed below:

Mol	Chain	Res	Type
2	C	119	GLN
2	D	184	ASN
2	C	124	ASN
2	D	105	ASN
3	E	149	ASN

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 Map visualisation

This section contains visualisations of the EMDB entry EMD-2240. These allow visual inspection of the internal detail of the map and identification of artifacts.

No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections

This section was not generated.

6.2 Central slices

This section was not generated.

6.3 Largest variance slices

This section was not generated.

6.4 Orthogonal surface views

This section was not generated.

6.5 Mask visualisation

This section was not generated. No masks/segmentation were deposited.

7 Map analysis

This section contains the results of statistical analysis of the map.

7.1 Map-value distribution

This section was not generated.

7.2 Volume estimate versus contour level

This section was not generated.

7.3 Rotationally averaged power spectrum

This section was not generated. The rotationally averaged power spectrum had issues being displayed.

8 Fourier-Shell correlation

This section was not generated. No FSC curve or half-maps provided.

9 Map-model fit

This section was not generated.