



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 20, 2024 – 12:48 PM EST

PDB ID : 4L8T  
Title : Structure of the Cargo Binding Domain from Human Myosin Vc  
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Deposited on : 2013-06-17  
Resolution : 2.95 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](mailto: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>.

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

MolProbity : 4.02b-467  
Xtriage (Phenix) : 1.13  
EDS : 2.36  
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) : 2.36

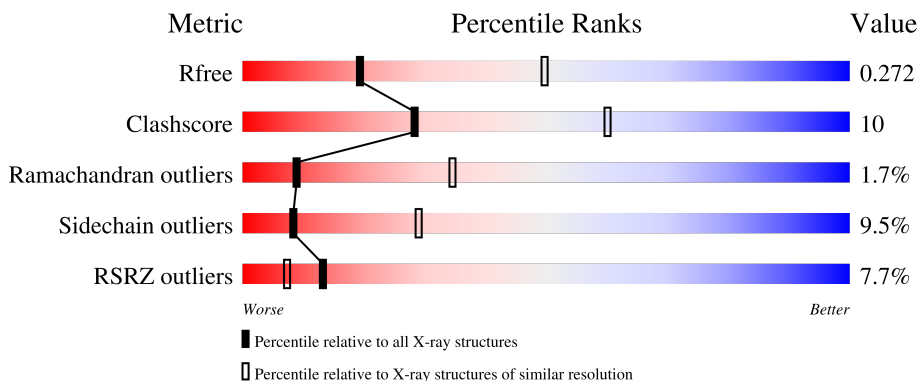
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.95 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	3104 (3.00-2.92)
Clashscore	141614	3462 (3.00-2.92)
Ramachandran outliers	138981	3340 (3.00-2.92)
Sidechain outliers	138945	3343 (3.00-2.92)
RSRZ outliers	127900	2986 (3.00-2.92)

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  $\geq 3$ , 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	447	

## 2 Entry composition i

There are 2 unique types of molecules in this entry. The entry contains 2957 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 Unconventional myosin-Vc.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	363	2950	1890	490	546	24	3	0	0

There are 23 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1296	MET	-	expression tag	UNP Q9NQX4
A	1297	HIS	-	expression tag	UNP Q9NQX4
A	1298	HIS	-	expression tag	UNP Q9NQX4
A	1299	HIS	-	expression tag	UNP Q9NQX4
A	1300	HIS	-	expression tag	UNP Q9NQX4
A	1301	HIS	-	expression tag	UNP Q9NQX4
A	1302	HIS	-	expression tag	UNP Q9NQX4
A	1303	SER	-	expression tag	UNP Q9NQX4
A	1304	SER	-	expression tag	UNP Q9NQX4
A	1305	GLY	-	expression tag	UNP Q9NQX4
A	1306	VAL	-	expression tag	UNP Q9NQX4
A	1307	ASP	-	expression tag	UNP Q9NQX4
A	1308	LEU	-	expression tag	UNP Q9NQX4
A	1309	GLY	-	expression tag	UNP Q9NQX4
A	1310	THR	-	expression tag	UNP Q9NQX4
A	1311	GLU	-	expression tag	UNP Q9NQX4
A	1312	ASN	-	expression tag	UNP Q9NQX4
A	1313	LEU	-	expression tag	UNP Q9NQX4
A	1314	TYR	-	expression tag	UNP Q9NQX4
A	1315	PHE	-	expression tag	UNP Q9NQX4
A	1316	GLN	-	expression tag	UNP Q9NQX4
A	1317	SER	-	expression tag	UNP Q9NQX4
A	1318	MET	-	expression tag	UNP Q9NQX4

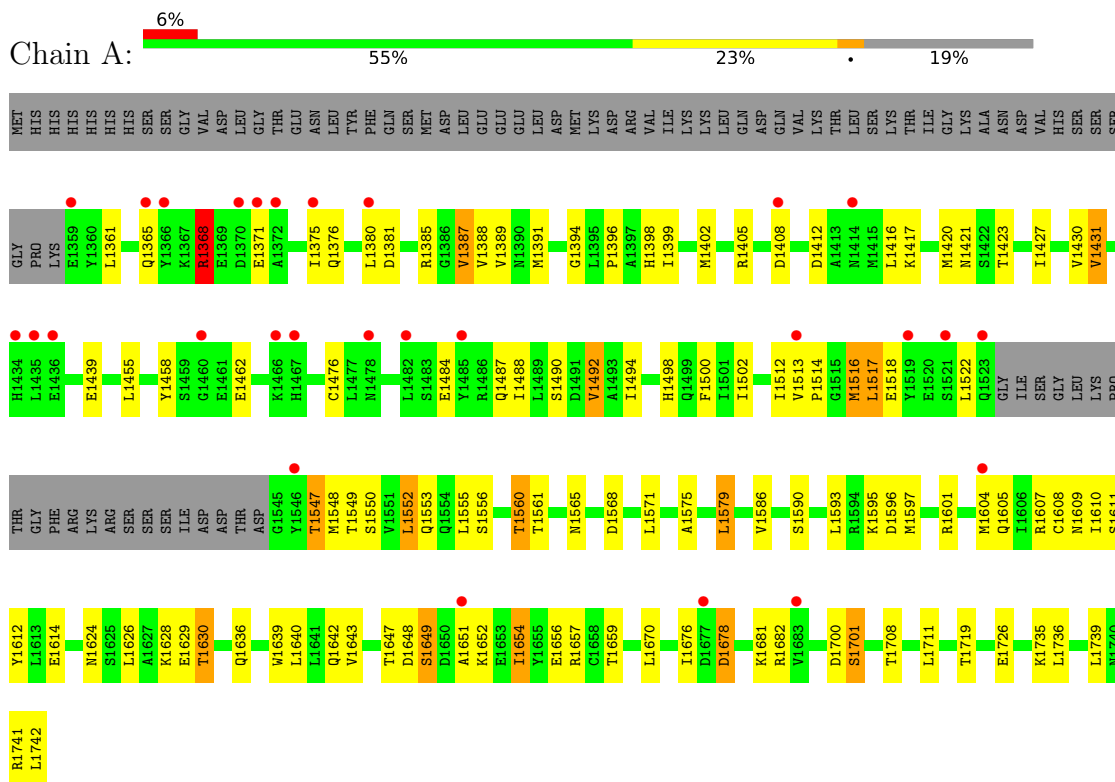
- Molecule 2 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	7	Total O 7 7	0	0

### 3 Residue-property plots

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: Unconventional myosin-Vc



## 4 Data and refinement statistics i

Property	Value	Source
Space group	P 41 2 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	116.40Å 116.40Å 114.75Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.07 – 2.95 47.41 – 2.95	Depositor EDS
% Data completeness (in resolution range)	99.3 (47.07-2.95) 99.4 (47.41-2.95)	Depositor EDS
$R_{merge}$	0.13	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.54 (at 2.96Å)	Xtrriage
Refinement program	PHENIX (phenix.refine: 1.8_1069)	Depositor
R, $R_{free}$	0.222 , 0.274 0.223 , 0.272	Depositor DCC
$R_{free}$ test set	865 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	85.8	Xtrriage
Anisotropy	0.360	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.30 , 120.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.021 for -h,-l,-k 0.008 for l,-k,h	Xtrriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	2957	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	158.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.85% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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	0.25	0/3006	0.44	0/4056

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	2950	0	2987	58	0
2	A	7	0	0	0	0
All	All	2957	0	2987	58	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 10.

All (58) 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:1514:PRO:HA	1:A:1518:GLU:HB2	1.65	0.77
1:A:1549:THR:HA	1:A:1552:LEU:HD12	1.79	0.63
1:A:1626:LEU:O	1:A:1630:THR:OG1	2.16	0.62
1:A:1556:SER:O	1:A:1560:THR:OG1	2.18	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1417:LYS:O	1:A:1421:ASN:ND2	2.29	0.58
1:A:1726:GLU:O	1:A:1741:ARG:NH2	2.38	0.57
1:A:1626:LEU:HA	1:A:1629:GLU:HG2	1.87	0.56
1:A:1498:HIS:O	1:A:1502:ILE:HG12	2.07	0.55
1:A:1365:GLN:HB2	1:A:1742:LEU:HD21	1.86	0.55
1:A:1596:ASP:OD1	1:A:1596:ASP:N	2.38	0.55
1:A:1736:LEU:HB3	1:A:1739:LEU:HD13	1.88	0.55
1:A:1636:GLN:HE22	1:A:1659:THR:HG22	1.72	0.54
1:A:1458:TYR:HB3	1:A:1476:CYS:HA	1.91	0.52
1:A:1547:THR:OG1	1:A:1548:MET:N	2.42	0.52
1:A:1552:LEU:HA	1:A:1555:LEU:HD12	1.92	0.52
1:A:1427:ILE:O	1:A:1431:VAL:HG12	2.09	0.52
1:A:1561:THR:O	1:A:1565:ASN:ND2	2.38	0.51
1:A:1639:TRP:CE2	1:A:1657:ARG:HD3	2.46	0.51
1:A:1368:ARG:HD3	1:A:1368:ARG:H	1.76	0.50
1:A:1651:ALA:HA	1:A:1654:ILE:HG13	1.94	0.49
1:A:1361:LEU:O	1:A:1405:ARG:NH2	2.45	0.49
1:A:1517:LEU:HB2	1:A:1597:MET:HE1	1.95	0.48
1:A:1490:SER:O	1:A:1494:ILE:HG13	2.14	0.48
1:A:1396:PRO:HA	1:A:1399:ILE:HD12	1.97	0.47
1:A:1549:THR:O	1:A:1553:GLN:HG3	2.15	0.46
1:A:1590:SER:HA	1:A:1593:LEU:HD12	1.98	0.46
1:A:1652:LYS:O	1:A:1656:GLU:HG2	2.16	0.46
1:A:1488:ILE:O	1:A:1492:VAL:HG12	2.17	0.45
1:A:1605:GLN:O	1:A:1609:ASN:ND2	2.50	0.45
1:A:1416:LEU:O	1:A:1420:MET:HG2	2.17	0.45
1:A:1498:HIS:CD2	1:A:1711:LEU:HD13	2.53	0.44
1:A:1376:GLN:NE2	1:A:1381:ASP:OD2	2.49	0.44
1:A:1398:HIS:O	1:A:1402:MET:HG3	2.17	0.44
1:A:1678:ASP:N	1:A:1678:ASP:OD1	2.51	0.43
1:A:1640:LEU:HD11	1:A:1670:LEU:HD21	2.01	0.43
1:A:1639:TRP:CE2	1:A:1643:VAL:HG21	2.53	0.43
1:A:1575:ALA:O	1:A:1579:LEU:HD22	2.18	0.43
1:A:1512:ILE:O	1:A:1516:MET:HB2	2.19	0.42
1:A:1371:GLU:O	1:A:1375:ILE:HG12	2.19	0.42
1:A:1439:GLU:OE1	1:A:1439:GLU:N	2.32	0.42
1:A:1427:ILE:O	1:A:1430:VAL:HG12	2.18	0.42
1:A:1420:MET:O	1:A:1423:THR:OG1	2.37	0.42
1:A:1394:GLY:O	1:A:1398:HIS:ND1	2.49	0.42
1:A:1682:ARG:H	1:A:1682:ARG:HG2	1.58	0.42
1:A:1513:VAL:HG23	1:A:1586:VAL:HG12	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1610:ILE:O	1:A:1614:GLU:HG3	2.20	0.42
1:A:1368:ARG:H	1:A:1368:ARG:CD	2.33	0.41
1:A:1462:GLU:CD	1:A:1462:GLU:H	2.23	0.41
1:A:1487:GLN:O	1:A:1487:GLN:NE2	2.53	0.41
1:A:1647:THR:HG23	1:A:1649:SER:HB3	2.03	0.41
1:A:1604:MET:HG2	1:A:1642:GLN:HG2	2.02	0.41
1:A:1647:THR:O	1:A:1649:SER:N	2.54	0.41
1:A:1624:ASN:O	1:A:1628:LYS:HG2	2.21	0.41
1:A:1484:GLU:O	1:A:1488:ILE:HG13	2.21	0.40
1:A:1568:ASP:OD2	1:A:1719:THR:HG21	2.22	0.40
1:A:1608:CYS:O	1:A:1611:SER:OG	2.30	0.40
1:A:1628:LYS:HG2	1:A:1628:LYS:H	1.74	0.40
1:A:1700:ASP:HB3	1:A:1701:SER:H	1.60	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	359/447 (80%)	331 (92%)	22 (6%)	6 (2%)	<b>9</b> <b>34</b>

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1387	VAL
1	A	1649	SER
1	A	1412	ASP
1	A	1648	ASP
1	A	1368	ARG
1	A	1522	LEU

### 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	338/414 (82%)	306 (90%)	32 (10%)	8 29

All (32) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1368	ARG
1	A	1380	LEU
1	A	1385	ARG
1	A	1387	VAL
1	A	1388	VAL
1	A	1389	VAL
1	A	1391	MET
1	A	1408	ASP
1	A	1431	VAL
1	A	1455	LEU
1	A	1492	VAL
1	A	1500	PHE
1	A	1516	MET
1	A	1517	LEU
1	A	1547	THR
1	A	1550	SER
1	A	1552	LEU
1	A	1560	THR
1	A	1571	LEU
1	A	1579	LEU
1	A	1595	LYS
1	A	1601	ARG
1	A	1607	ARG
1	A	1612	TYR
1	A	1630	THR
1	A	1654	ILE
1	A	1676	ILE
1	A	1678	ASP
1	A	1681	LYS
1	A	1701	SER

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Mol	Chain	Res	Type
1	A	1708	THR
1	A	1735	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	1475	ASN
1	A	1498	HIS
1	A	1692	GLN
1	A	1723	HIS

### 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 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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	363/447 (81%)	0.50	28 (7%) <b>13</b> <b>7</b>	116, 155, 196, 227	4 (1%)

All (28) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	1436	GLU	4.5
1	A	1519	TYR	4.3
1	A	1523	GLN	4.0
1	A	1478	ASN	3.9
1	A	1467	HIS	3.9
1	A	1380	LEU	3.7
1	A	1435	LEU	3.7
1	A	1546	TYR	3.4
1	A	1366	TYR	3.4
1	A	1521	SER	3.3
1	A	1683	VAL	3.1
1	A	1485	TYR	3.1
1	A	1365	GLN	3.0
1	A	1372	ALA	2.9
1	A	1359	GLU	2.9
1	A	1371	GLU	2.7
1	A	1466	LYS	2.5
1	A	1414	ASN	2.4
1	A	1434	HIS	2.3
1	A	1651	ALA	2.3
1	A	1482	LEU	2.3
1	A	1677	ASP	2.2
1	A	1513	VAL	2.2
1	A	1408	ASP	2.2
1	A	1460	GLY	2.1
1	A	1375	ILE	2.1
1	A	1370	ASP	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	1604	MET	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](#)

There are no ligands in this entry.

## 6.5 Other polymers [i](#)

There are no such residues in this entry.