



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 20, 2026 – 07:34 AM UTC

PDB ID : 4L8T / pdb_00004l8t
Title : Structure of the Cargo Binding Domain from Human Myosin Vc
Authors : Nascimento, A.F.Z.; Tonoli, C.C.C.; Trindade, D.M.; Assis, L.H.P.; Mahajan, P.; Berridge, G.; Krojer, T.; Burgess-Brown, N.; von Delft, F.; Murakami, M.T.
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

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

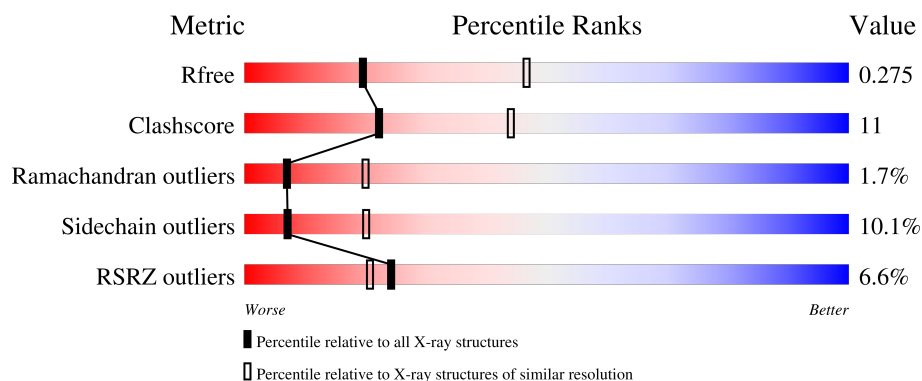
1 Overall quality at a glance

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}	180053	1130 (2.98-2.94)
Clashscore	190562	1157 (2.98-2.94)
Ramachandran outliers	187476	1101 (2.98-2.94)
Sidechain outliers	187428	1101 (2.98-2.94)
RSRZ outliers	180081	1130 (2.98-2.94)

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	447	5% 53% 24% • 19%

2 Entry composition

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

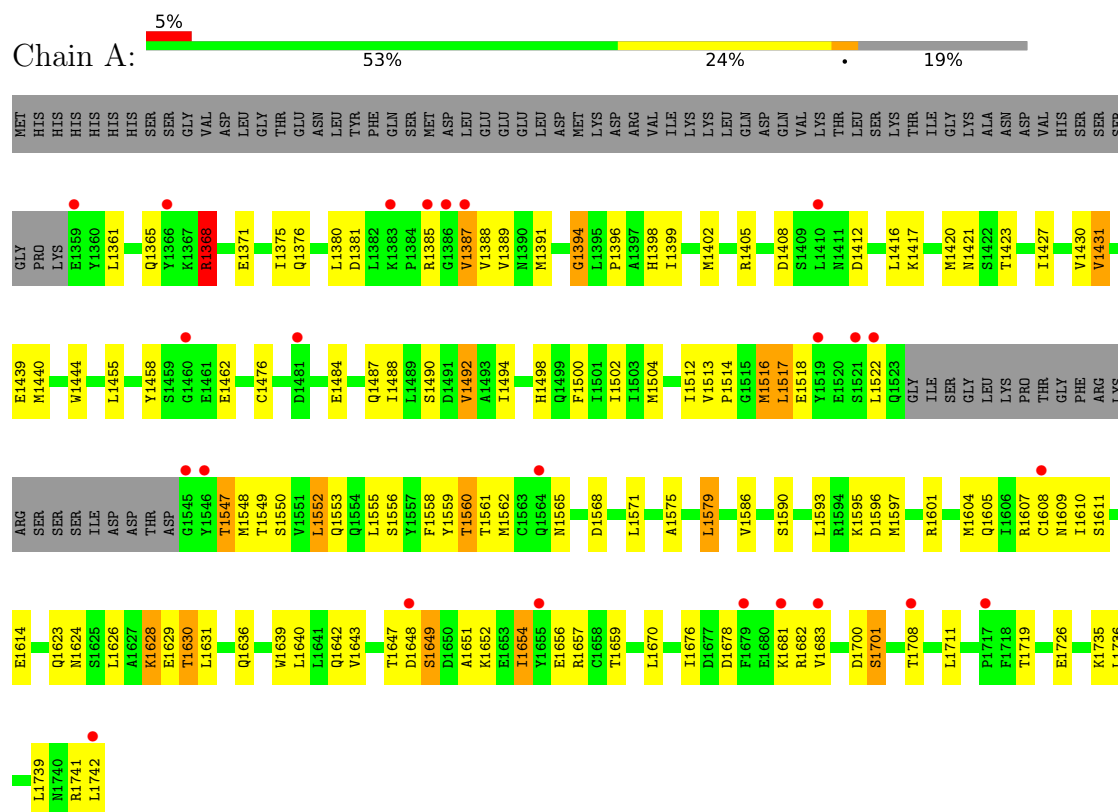
- Molecule 2 is water.

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

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

Property	Value	Source
Space group	P 41 2 2	Depositor
Cell constants a, b, c, α , β , γ	116.40Å 116.40Å 114.75Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.07 – 2.95 47.07 – 2.95	Depositor EDS
% Data completeness (in resolution range)	99.3 (47.07-2.95) 99.4 (47.07-2.95)	Depositor EDS
R_{merge}	0.13	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.54 (at 2.96Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.8_1069)	Depositor
R, R_{free}	0.222 , 0.274 0.227 , 0.275	Depositor DCC
R_{free} test set	865 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å ²)	85.8	Xtriage
Anisotropy	0.360	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 122.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.021 for -h,-l,-k 0.008 for l,-k,h	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	2957	wwPDB-VP
Average B, all atoms (Å ²)	158.0	wwPDB-VP

Xtriage'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.*

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	0.30	0/3006	0.75	1/4056 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1394	GLY	N-CA-C	-5.78	107.70	115.21

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	63	0
2	A	7	0	0	0	0
All	All	2957	0	2987	63	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.

All (63) 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

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1440:MET:HE3	1:A:1444:TRP:HE1	1.58	0.68
1:A:1517:LEU:HD13	1:A:1597:MET:HE2	1.78	0.65
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
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:1490:SER:O	1:A:1494:ILE:HG13	2.14	0.48
1:A:1726:GLU:H	1:A:1726:GLU:CD	2.20	0.47
1:A:1396:PRO:HA	1:A:1399:ILE:HD12	1.97	0.47
1:A:1504:MET:HE2	1:A:1558:PHE:HB3	1.95	0.46
1:A:1462:GLU:CD	1:A:1462:GLU:H	2.23	0.46
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:1517:LEU:HB2	1:A:1597:MET:HE1	1.99	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

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
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
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:1487:GLN:O	1:A:1487:GLN:NE2	2.53	0.41
1:A:1559:TYR:HA	1:A:1562:MET:HE3	2.01	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%)	7 20

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 ⓘ

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%)	304 (90%)	34 (10%)	7 20

All (34) 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

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	A	1601	ARG
1	A	1607	ARG
1	A	1623	GLN
1	A	1628	LYS
1	A	1630	THR
1	A	1631	LEU
1	A	1654	ILE
1	A	1676	ILE
1	A	1681	LYS
1	A	1683	VAL
1	A	1701	SER
1	A	1708	THR
1	A	1735	LYS

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

Mol	Chain	Res	Type
1	A	1390	ASN
1	A	1473	ASN
1	A	1479	ASN
1	A	1498	HIS
1	A	1624	ASN
1	A	1671	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	363/447 (81%)	0.56	24 (6%) 24 21	116, 155, 195, 227	4 (1%)

All (24) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	1608	CYS	5.9
1	A	1521	SER	4.9
1	A	1481	ASP	3.4
1	A	1410	LEU	2.9
1	A	1386	GLY	2.8
1	A	1387	VAL	2.7
1	A	1679	PHE	2.7
1	A	1708	THR	2.7
1	A	1519	TYR	2.6
1	A	1383	LYS	2.6
1	A	1385	ARG	2.6
1	A	1359	GLU	2.5
1	A	1564	GLN	2.5
1	A	1717	PRO	2.5
1	A	1681	LYS	2.5
1	A	1460	GLY	2.4
1	A	1648	ASP	2.4
1	A	1545	GLY	2.4
1	A	1742	LEU	2.3
1	A	1366	TYR	2.2
1	A	1655	TYR	2.1
1	A	1522	LEU	2.1
1	A	1546	TYR	2.0
1	A	1683	VAL	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.