



# wwPDB X-ray Structure Validation Summary Report ⓘ

Jun 24, 2024 – 01:39 AM EDT

PDB ID : 6QDM  
Title : Molecular features of the UNC-45 chaperone critical for binding and folding muscle myosin  
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Deposited on : 2019-01-02  
Resolution : 3.80 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](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) : 1.20.1  
EDS : 2.37.1  
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) : 2.37.1

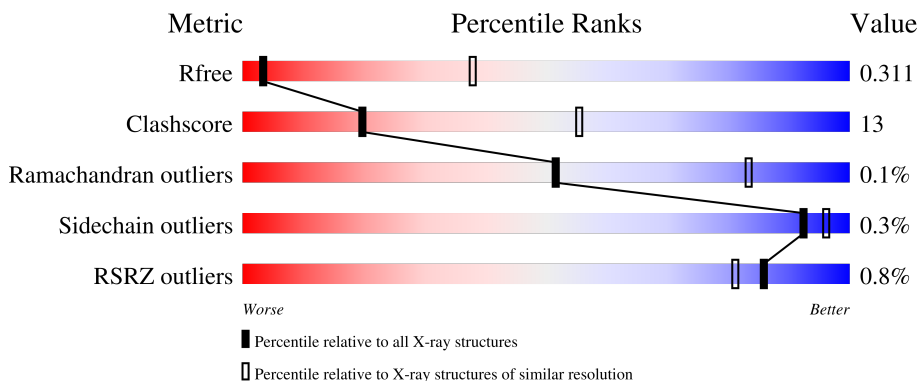
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.80 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))
$R_{free}$	130704	1212 (4.00-3.60)
Clashscore	141614	1288 (4.00-3.60)
Ramachandran outliers	138981	1243 (4.00-3.60)
Sidechain outliers	138945	1237 (4.00-3.60)
RSRZ outliers	127900	1121 (4.00-3.60)

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  $\geq 3$ , 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	963	
1	B	963	

## 2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 11813 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.

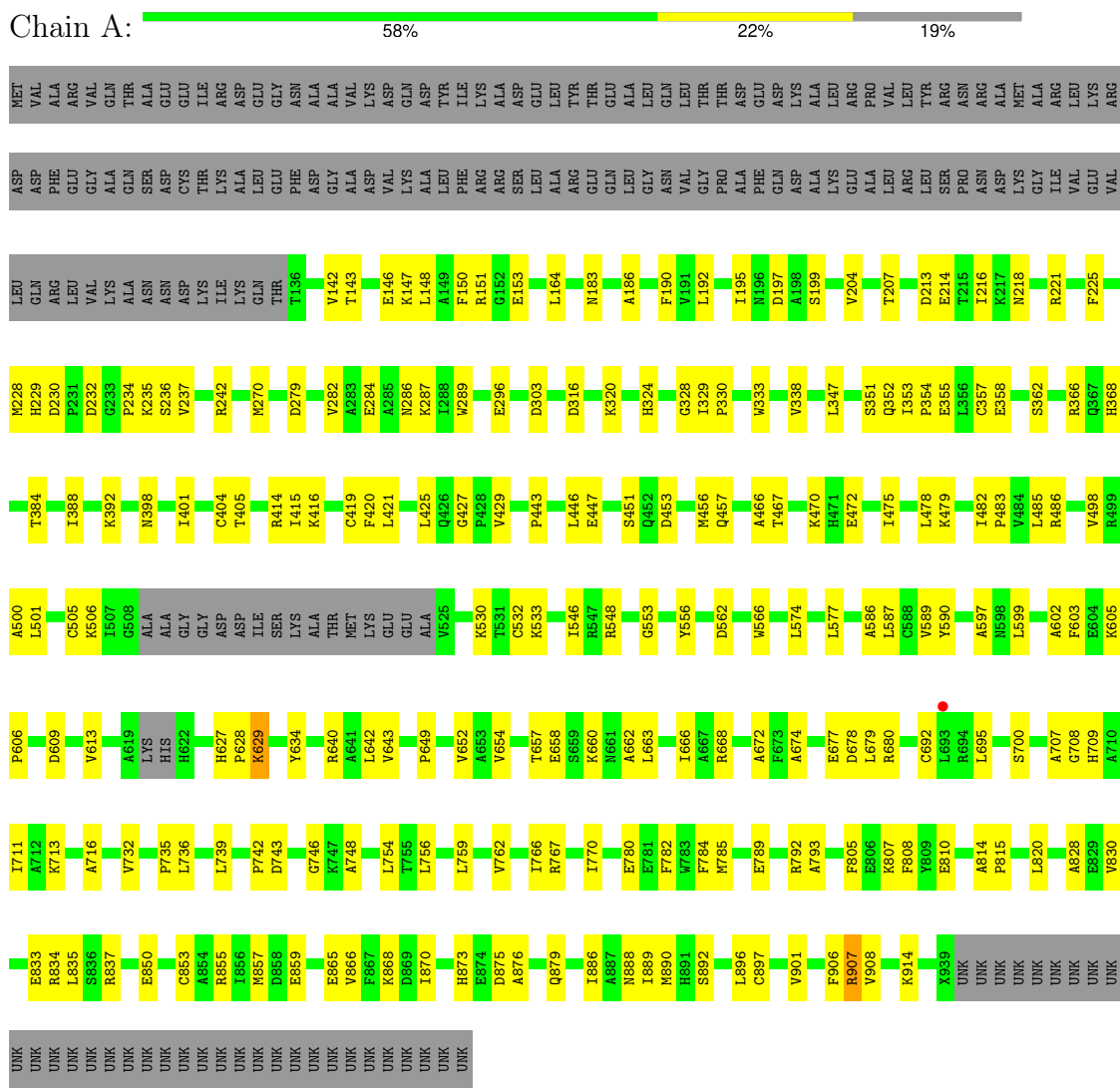
- Molecule 1 is a protein called UNC-45,UNC-45.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	776	Total 6035	C 3830	N 1028	O 1134	S 43	0	0	0
1	B	739	Total 5778	C 3670	N 981	O 1085	S 42	0	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: UNC-45,UNC-45



- Molecule 1: UNC-45,UNC-45



MET	VAL	ASP	ASP	LEU	P281	S353	ALA	Y590	Y676	A793	E904
VAL	ALA	PHE	GLU	GLN	D232	Q352	ILE	T591	L679	A796	Y905
ALA	ARG	LEU	GLY	ARG	G233	L353	M476	L592	R680	L799	F906
VAL	VAL	VAL	VAL	VAL	P234	M477	L478	T594	E686	L802	F907
GLN	LYS	ALA	ALA	LYS	S236	C357	K479	I595	T689	L805	V908
THR	ALA	GLN	ASN	ALA	R242	E358	I482	Y596	L693	P805	L909
ALA	SER	SER	ASN	ASN	W244	T359	P483	M601	T696	E806	K914
GLU	ASN	ASN	ASN	ASN	M244	P360	R486	E604	K697	K807	L915
GLU	ASP	GLY	ASP	ASP	Q261	S362	Y489	K605	T696	L820	UNK
GLU	LYS	THR	LYS	ILE	M285	A363	Y496	PRO	K697	Y826	UNK
GLY	ALA	LYS	ALA	GLN	M270	E364	T496	LYS	S700	Y830	UNK
ASN	ASP	PHE	ALA	THR	D271	H368	V496	VAL	K704	V830	UNK
ALA	GLY	ASN	GLY	GLY	R272	V369	K497	ASP	I705	W834	UNK
VAL	VAL	ALA	VAL	VAL	E284	I371	L501	GLU	A767	L835	UNK
LYS	LYS	ASP	LYS	PHE	A285	K385	K506	VAL	G708	S836	UNK
ASP	VAL	LYS	ASP	ALA	M286	D394	I507	ALA	I711	A838	UNK
GLN	ALA	LYS	ALA	LYS	K287	N398	G508	GLN	L714	A841	UNK
TYR	LEU	LEU	LEU	GLY	I288	I401	ALA	PHE	G715	I845	UNK
ILE	PHE	PHE	ALA	GLY	I290	C404	GLY	ALA	A716	E848	UNK
LYS	ARG	ARG	ALA	ASP	I291	K416	ASP	ALA	V732	D849	UNK
ALA	ARG	ARG	ALA	ASP	R292	M300	ILE	VAL	P735	E850	UNK
ALA	ARG	ARG	ALA	ASP	R292	F420	LYS	PRO	H741	C853	UNK
GLY	GLY	GLY	ALA	PRO	R311	L425	ALA	THR	P742	R854	UNK
PRO	PRO	ALA	LEU	LEU	E312	L436	MET	GLU	D628	R855	UNK
THR	THR	ALA	GLY	THR	L319	T437	LYS	GLU	V744	I856	UNK
THR	THR	ALA	GLY	THR	K390	M438	GLU	GLU	E745	M857	UNK
THR	THR	ALA	PRO	THR	N321	D439	AS24	Y634	V762	D858	UNK
THR	THR	ALA	ALA	THR	L187	L322	V525	R638	R766	E859	UNK
ASP	PHE	GLN	GLN	ASP	V188	L441	I526	V643	R767	W863	UNK
LYS	ASP	LYS	LYS	ASP	P189	T442	K530	V648	I770	P864	UNK
ALA	ALA	LYS	LYS	ALA	F190	P443	K533	P649	L771	F867	UNK
LYS	LYS	LEU	LEU	LYS	V204	E447	R548	V648	I776	I870	UNK
GLU	GLU	ARG	ARG	GLU	T205	D453	Y549	P649	P777	H873	UNK
ALA	ALA	PRO	VAL	VAL	V206	L459	A550	V652	E780	D874	UNK
VAL	VAL	VAL	ARG	LEU	T207	T459	C551	V654	E781	D875	UNK
TYR	TYR	LEU	LEU	LEU	T209	E462	E552	T657	F782	A876	UNK
ARG	ARG	SER	ARG	SER	R210	R341	S555	K660	F784	T878	UNK
ASN	ASN	PRO	ASN	PRO	I211	G342	Y556	R668	M785	Q879	UNK
ARG	ARG	ASN	ARG	ASN	R221	L343	L580	L670	M785	R880	UNK
ALA	ASP	ASP	ALA	ASP	L226	T467	L580	S669	H788	R881	UNK
LYS	LYS	MET	LYS	LYS	A227	V468	L580	L670	L791	S892	UNK
ILE	GLY	ILE	ILE	ILE	H228	S469	L580	L670	R792	L896	UNK
VAL	VAL	VAL	VAL	VAL	H229	K470	L580	L670	L791	L896	UNK
LYS	LYS	VAL	VAL	VAL	V349	HIS	L580	L670	L791	L896	UNK
GLU	GLU	GLU	GLU	GLU	A350	GLU	L580	L670	L791	L896	UNK
LYS	LYS	VAL	VAL	VAL	A350	ARG	L580	L670	L791	L896	UNK
VAL	VAL	VAL	VAL	VAL	A350	ARG	L580	L670	L791	L896	UNK

## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	157.39Å 97.61Å 148.88Å 90.00° 93.41° 90.00°	Depositor
Resolution (Å)	48.80 – 3.80 48.80 – 3.80	Depositor EDS
% Data completeness (in resolution range)	98.7 (48.80-3.80) 89.0 (48.80-3.80)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	0.71 (at 3.77Å)	Xtrriage
Refinement program	PHENIX (1.13_2998: ???), CNS	Depositor
R, $R_{free}$	0.280 , 0.310 0.283 , 0.311	Depositor DCC
$R_{free}$ test set	1137 reflections (5.13%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	173.5	Xtrriage
Anisotropy	0.351	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.27 , 159.9	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.46$ , $\langle L^2 \rangle = 0.28$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	11813	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	199.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.97% 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	0.66	0/6058	0.81	0/8178
1	B	0.63	0/5863	0.78	0/7912
All	All	0.64	0/11921	0.79	0/16090

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	6035	0	6128	154	4
1	B	5778	0	5926	152	2
All	All	11813	0	12054	304	4

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 13.

The worst 5 of 304 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:441:LEU:HD23	1:B:477:MET:SD	1.82	1.19
1:A:229:HIS:O	1:A:230:ASP:OD1	1.85	0.95

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:551:CYS:SG	1:B:580:LEU:HD22	2.19	0.83
1:B:742:PRO:HG3	1:B:782:PHE:CE2	2.14	0.83
1:A:850:GLU:HG2	1:A:892:SER:HB2	1.61	0.82

All (4) 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:A:472:GLU:CG	1:A:472:GLU:CG[2_656]	1.82	0.38
1:A:355:GLU:CG	1:B:907:ARG:NH1[1_556]	1.86	0.34
1:A:453:ASP:OD2	1:B:914:LYS:NZ[1_556]	2.11	0.09
1:A:533:LYS:CE	1:A:810:GLU:OE1[4_546]	2.15	0.05

## 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	756/963 (78%)	726 (96%)	29 (4%)	1 (0%)	51 83
1	B	731/963 (76%)	710 (97%)	20 (3%)	1 (0%)	51 83
All	All	1487/1926 (77%)	1436 (97%)	49 (3%)	2 (0%)	51 83

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	230	ASP
1	A	606	PRO

### 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	652/775 (84%)	650 (100%)	2 (0%)	92	96
1	B	631/775 (81%)	629 (100%)	2 (0%)	92	96
All	All	1283/1550 (83%)	1279 (100%)	4 (0%)	92	96

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

Mol	Chain	Res	Type
1	A	629	LYS
1	A	907	ARG
1	B	341	ARG
1	B	479	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	229	HIS
1	A	324	HIS
1	B	367	GLN
1	B	398	ASN
1	B	598	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](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	A	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	A	915:LEU	C	926:UNK	N	7.00

## 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, 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	762/963 (79%)	-0.35	1 (0%) 95 95	133, 190, 238, 297	0
1	B	739/963 (76%)	-0.35	11 (1%) 73 66	142, 205, 248, 336	0
All	All	1501/1926 (77%)	-0.35	12 (0%) 86 81	133, 197, 246, 336	0

The worst 5 of 12 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	462	GLU	4.3
1	B	904	GLU	4.2
1	B	745	GLU	3.9
1	B	477	MET	2.8
1	B	244	MET	2.7

### 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.