



wwPDB X-ray Structure Validation Summary Report

Feb 27, 2014 – 02:00 PM GMT

PDB ID : 3H2U
Title : Human raver1 RRM1, RRM2, and RRM3 domains in complex with human vinculin tail domain Vt
Authors : Lee, J.H.; Rangarajan, E.S.; Yogesha, S.D.; Izard, T.
Deposited on : 2009-04-14
Resolution : 2.75 Å(reported)

This is a wwPDB validation summary report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at <http://wwpdb.org/ValidationPDFNotes.html>

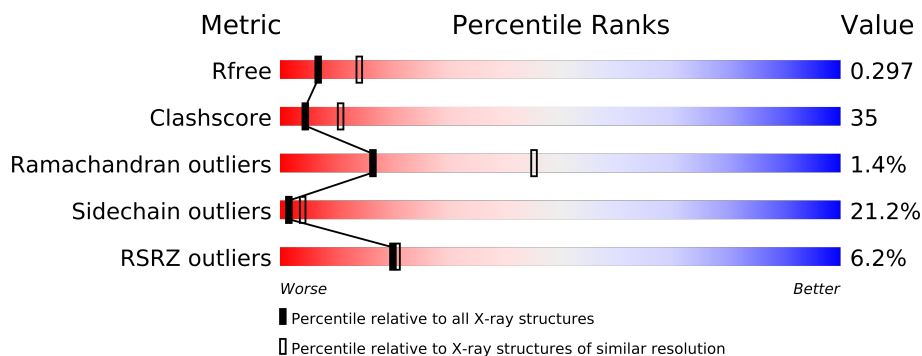
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity	:	4.02b-467
Mogul	:	1.15 2013
Xtriage (Phenix)	:	dev-1323
EDS	:	stable22639
Percentile statistics	:	21963
Refmac	:	5.8.0049
CCP4	:	6.3.0 (Settle)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP)	:	stable22683

1 Overall quality at a glance

The reported resolution of this entry is 2.75 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}	66092	2406 (2.80-2.72)
Clashscore	79885	2995 (2.80-2.72)
Ramachandran outliers	78287	2941 (2.80-2.72)
Sidechain outliers	78261	2944 (2.80-2.72)
RSRZ outliers	66119	2409 (2.80-2.72)

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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Mol	Chain	Length	Quality of chain
1	A	188	
1	C	188	
2	B	283	
2	D	283	

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 7167 atoms, of which 0 are hydrogen and 0 are deuterium.

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 Vinculin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	182	Total	C	N	O	S	0	0	0
			1414	867	264	271	12			
1	C	174	Total	C	N	O	S	0	0	0
			1364	839	255	258	12			

- Molecule 2 is a protein called Raver-1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	279	Total	C	N	O	S	0	0	0
			2170	1361	389	408	12			
2	D	280	Total	C	N	O	S	0	0	0
			2178	1367	390	409	12			

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	14	Total	O	0	0
			14	14		
3	B	15	Total	O	0	0
			15	15		
3	C	3	Total	O	0	0
			3	3		
3	D	9	Total	O	0	0
			9	9		

3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

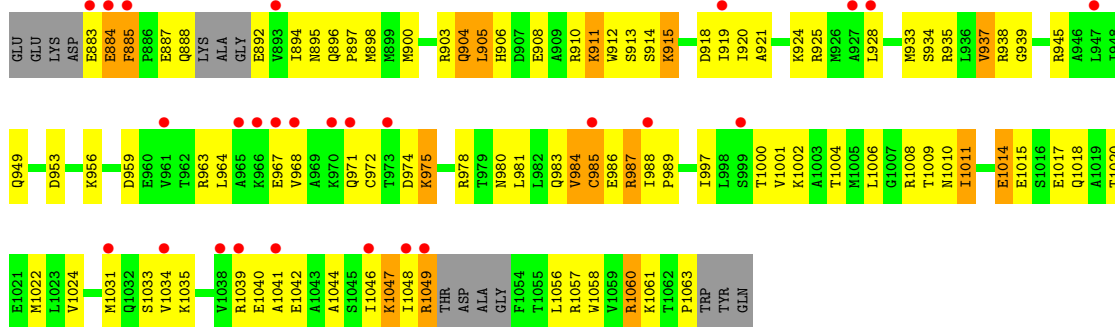
• Molecule 1: Vinculin

Chain A: 



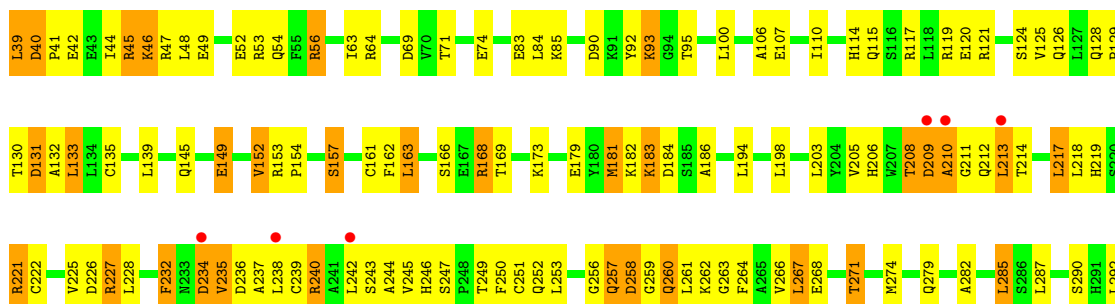
• Molecule 1: Vinculin

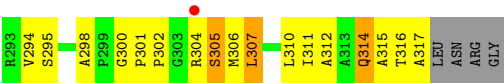
Chain C: 



• Molecule 2: Raver-1

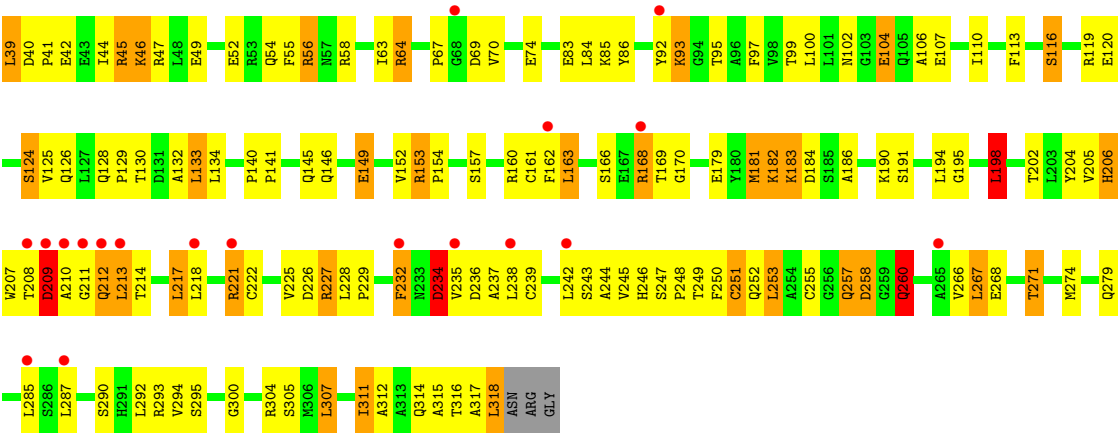
Chain B: 





● Molecule 2: Raver-1

Chain D:



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	86.75Å 94.91Å 186.03Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 2.75 47.45 – 2.75	Depositor EDS
% Data completeness (in resolution range)	99.7 (20.00-2.75) 99.8 (47.45-2.75)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.19 (at 2.77Å)	Xtriage
Refinement program	BUSTER-TNT 2.1.1	Depositor
R, R_{free}	0.225 , 0.274 0.242 , 0.297	Depositor DCC
R_{free} test set	2033 reflections (5.27%)	DCC
Wilson B-factor (Å ²)	58.6	Xtriage
Anisotropy	0.400	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 49.6	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Outliers	0 of 40618 reflections	Xtriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	7167	wwPDB-VP
Average B, all atoms (Å ²)	63.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.39% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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	1.35	20/1425 (1.4%)	0.94	4/1911 (0.2%)
1	C	0.59	0/1373	0.72	0/1838
2	B	0.68	0/2213	0.84	2/2994 (0.1%)
2	D	0.60	0/2221	0.80	1/3005 (0.0%)
All	All	0.82	20/7232 (0.3%)	0.83	7/9748 (0.1%)

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	1
2	B	0	2
2	D	0	3
All	All	0	6

The worst 5 of 20 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	892	GLU	CD-OE2	-15.37	1.08	1.25
1	A	893	VAL	CB-CG2	-14.41	1.22	1.52
1	A	893	VAL	CB-CG1	-12.96	1.25	1.52
1	A	892	GLU	CG-CD	-12.06	1.33	1.51
1	A	894	ILE	CA-CB	-10.69	1.30	1.54

The worst 5 of 7 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	893	VAL	CG1-CB-CG2	-10.27	94.46	110.90
1	A	1062	THR	C-N-CD	-9.39	99.93	120.60
1	A	894	ILE	CG1-CB-CG2	-8.54	92.61	111.40
2	D	198	LEU	N-CA-C	-5.58	95.94	111.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	893	VAL	CB-CA-C	-5.22	101.48	111.40

There are no chirality outliers.

5 of 6 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	892	GLU	Peptide
2	B	208	THR	Peptide
2	B	210	ALA	Peptide
2	D	208	THR	Peptide
2	D	209	ASP	Peptide

5.2 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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1414	0	1469	88	0
1	C	1364	0	1423	92	0
2	B	2170	0	2147	169	0
2	D	2178	0	2158	174	0
3	A	14	0	0	0	0
3	B	15	0	0	0	0
3	C	3	0	0	0	0
3	D	9	0	0	0	0
All	All	7167	0	7197	505	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 35.

The worst 5 of 505 close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
2:D:234:ASP:O	2:D:253:LEU:HD11	1.42	1.16
1:A:891:GLY:HA3	1:A:892:GLU:CB	1.76	1.16
2:B:209:ASP:OD2	2:B:211:GLY:N	1.80	1.14
2:D:209:ASP:N	2:D:211:GLY:HA3	1.61	1.14

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:1062:THR:HB	1:A:1063:PRO:CD	1.77	1.14

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone ⓘ

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	180/188 (96%)	167 (93%)	9 (5%)	4 (2%)	10	29
1	C	168/188 (89%)	159 (95%)	8 (5%)	1 (1%)	33	70
2	B	277/283 (98%)	256 (92%)	17 (6%)	4 (1%)	16	45
2	D	278/283 (98%)	258 (93%)	16 (6%)	4 (1%)	16	45
All	All	903/942 (96%)	840 (93%)	50 (6%)	13 (1%)	16	45

5 of 13 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	892	GLU
1	A	984	VAL
2	B	263	GLY
2	B	316	THR
2	D	260	GLN

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	153/159 (96%)	119 (78%)	34 (22%)	1 3

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	C	149/159 (94%)	119 (80%)	30 (20%)	2	5
2	B	230/233 (99%)	185 (80%)	45 (20%)	2	5
2	D	231/233 (99%)	178 (77%)	53 (23%)	1	3
All	All	763/784 (97%)	601 (79%)	162 (21%)	1	4

5 of 162 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	285	LEU
1	C	937	VAL
2	D	260	GLN
2	B	304	ARG
1	C	892	GLU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 29 such sidechains are listed below:

Mol	Chain	Res	Type
2	B	246	HIS
1	C	895	ASN
2	D	212	GLN
2	B	260	GLN
1	C	904	GLN

5.3.3 RNA ⓘ

There are no RNA chains 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 carbohydrates in this entry.

5.6 Ligand geometry ⓘ

There are no ligands in this entry.

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues

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	182/188 (96%)	0.24	4 (2%) 59 62	23, 43, 91, 111	0
1	C	174/188 (92%)	1.00	27 (15%) 3 3	48, 69, 112, 135	0
2	B	279/283 (98%)	0.25	7 (2%) 54 58	32, 55, 96, 126	0
2	D	280/283 (98%)	0.50	19 (6%) 17 17	44, 69, 108, 137	0
All	All	915/942 (97%)	0.47	57 (6%) 20 21	23, 61, 102, 137	0

The worst 5 of 57 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	D	213	LEU	7.0
1	C	1038	VAL	7.0
1	C	965	ALA	6.9
2	D	238	LEU	6.8
2	D	209	ASP	6.5

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

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

6.3 Carbohydrates ⓘ

There are no carbohydrates in this entry.

6.4 Ligands ⓘ

There are no ligands in this entry.

6.5 Other polymers ⓘ

There are no such residues in this entry.