



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 28, 2014 – 06:06 PM GMT

PDB ID : 3HTU  
Title : Crystal structure of the human VPS25-VPS20 subcomplex  
Authors : Im, Y.J.; Hurley, J.H.  
Deposited on : 2009-06-12  
Resolution : 2.00 Å(reported)

This is a full wwPDB 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 <http://wwpdb.org/ValidationPDFNotes.html>

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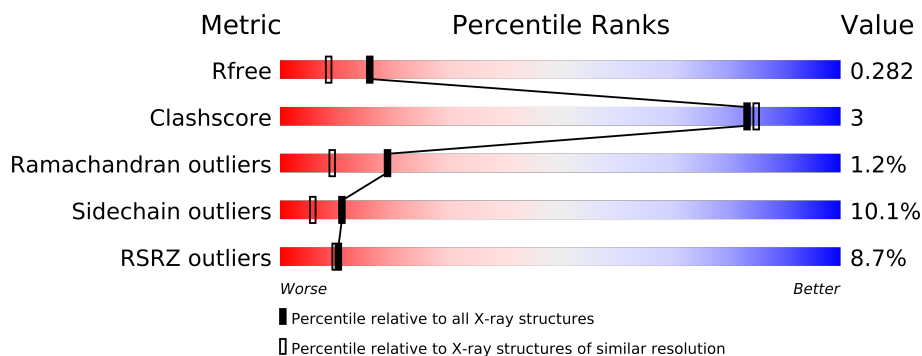
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467  
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 2.00 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)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	66092	4888 (2.00-2.00)
Clashscore	79885	6188 (2.00-2.00)
Ramachandran outliers	78287	6102 (2.00-2.00)
Sidechain outliers	78261	6100 (2.00-2.00)
RSRZ outliers	66119	4890 (2.00-2.00)

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  $\geq 3$ , 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	79	
1	C	79	
1	E	79	
1	G	79	
2	B	39	
2	D	39	
2	F	39	
2	H	39	

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 3870 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 Vacuolar protein-sorting-associatedprotein 25.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
1	A	75	Total	C	N	O	0	0	0
			616	386	107	123			
1	C	75	Total	C	N	O	0	0	0
			616	386	107	123			
1	E	75	Total	C	N	O	0	0	0
			616	386	107	123			
1	G	75	Total	C	N	O	0	0	0
			616	386	107	123			

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	98	GLY	-	EXPRESSION TAG	UNP Q9BRG1
A	99	ALA	-	EXPRESSION TAG	UNP Q9BRG1
A	100	MET	-	EXPRESSION TAG	UNP Q9BRG1
A	101	GLY	-	EXPRESSION TAG	UNP Q9BRG1
C	98	GLY	-	EXPRESSION TAG	UNP Q9BRG1
C	99	ALA	-	EXPRESSION TAG	UNP Q9BRG1
C	100	MET	-	EXPRESSION TAG	UNP Q9BRG1
C	101	GLY	-	EXPRESSION TAG	UNP Q9BRG1
E	98	GLY	-	EXPRESSION TAG	UNP Q9BRG1
E	99	ALA	-	EXPRESSION TAG	UNP Q9BRG1
E	100	MET	-	EXPRESSION TAG	UNP Q9BRG1
E	101	GLY	-	EXPRESSION TAG	UNP Q9BRG1
G	98	GLY	-	EXPRESSION TAG	UNP Q9BRG1
G	99	ALA	-	EXPRESSION TAG	UNP Q9BRG1
G	100	MET	-	EXPRESSION TAG	UNP Q9BRG1
G	101	GLY	-	EXPRESSION TAG	UNP Q9BRG1

- Molecule 2 is a protein called Vacuolar protein-sorting-associatedprotein 20.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	B	35	Total	C	N	O	0	0	0
			300	182	62	56			
2	D	36	Total	C	N	O	0	0	0
			311	188	66	57			
2	F	32	Total	C	N	O	0	0	0
			271	166	56	49			
2	H	36	Total	C	N	O	0	0	0
			311	188	66	57			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	10	GLY	-	EXPRESSION TAG	UNP Q96FZ7
D	10	GLY	-	EXPRESSION TAG	UNP Q96FZ7
F	10	GLY	-	EXPRESSION TAG	UNP Q96FZ7
H	10	GLY	-	EXPRESSION TAG	UNP Q96FZ7

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	38	Total	O	0	0
			38	38		
3	B	19	Total	O	0	0
			19	19		
3	C	43	Total	O	0	0
			43	43		
3	D	16	Total	O	0	0
			16	16		
3	E	23	Total	O	0	0
			23	23		
3	F	22	Total	O	0	0
			22	22		
3	G	21	Total	O	0	0
			21	21		
3	H	31	Total	O	0	0
			31	31		

### 3 Residue-property plots i

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 ( $\text{RSRZ} > 2$ ). 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: Vacuolar protein-sorting-associatedprotein 25

Chain A: 



- Molecule 1: Vacuolar protein-sorting-associatedprotein 25

Chain C: 



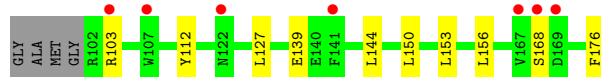
- Molecule 1: Vacuolar protein-sorting-associatedprotein 25

Chain E: 



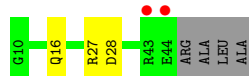
- Molecule 1: Vacuolar protein-sorting-associatedprotein 25

Chain G: 



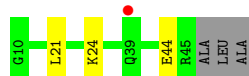
- Molecule 2: Vacuolar protein-sorting-associatedprotein 20

Chain B: 

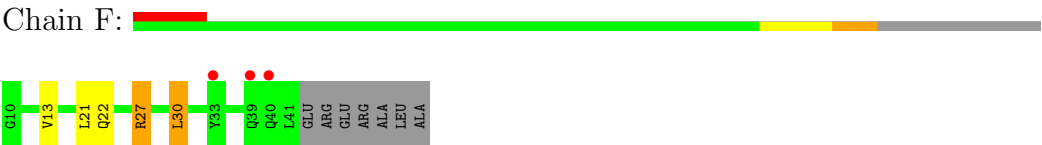


- Molecule 2: Vacuolar protein-sorting-associatedprotein 20

Chain D: 



- Molecule 2: Vacuolar protein-sorting-associatedprotein 20



- Molecule 2: Vacuolar protein-sorting-associatedprotein 20



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	58.56Å 51.04Å 76.99Å 90.00° 90.39° 90.00°	Depositor
Resolution (Å)	50.00 – 2.00 38.48 – 2.00	Depositor EDS
% Data completeness (in resolution range)	98.4 (50.00-2.00) 98.4 (38.48-2.00)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.06	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.70 (at 2.00Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, $R_{free}$	0.239 , 0.273 0.256 , 0.282	Depositor DCC
$R_{free}$ test set	1544 reflections (5.33%)	DCC
Wilson B-factor (Å <sup>2</sup> )	32.2	Xtriage
Anisotropy	0.619	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.32 , 35.7	EDS
Estimated twinning fraction	0.027 for h,-k,-l	Xtriage
L-test for twinning	$\langle  L  \rangle = 0.51$ , $\langle L^2 \rangle = 0.34$	Xtriage
Outliers	0 of 30539 reflections	Xtriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	3870	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	32.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 11.98% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities 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	0.53	0/628	0.63	0/846
1	C	0.56	0/628	0.66	0/846
1	E	0.52	0/628	0.63	0/846
1	G	0.52	0/628	0.62	0/846
2	B	0.65	0/300	0.71	0/396
2	D	0.62	0/311	0.70	0/410
2	F	0.59	0/271	0.83	1/358 (0.3%)
2	H	0.66	0/311	0.76	0/410
All	All	0.56	0/3705	0.67	1/4958 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	F	27	ARG	NE-CZ-NH1	5.10	122.85	120.30

There are no chirality outliers.

There are no planarity outliers.

### 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	616	0	0	2	0
1	C	616	0	0	3	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	E	616	0	0	1	0
1	G	616	0	0	1	0
2	B	300	0	0	2	0
2	D	311	0	0	1	0
2	F	271	0	0	1	0
2	H	311	0	0	2	0
3	A	38	0	0	0	0
3	B	19	0	0	0	0
3	C	43	0	0	1	0
3	D	16	0	0	3	0
3	E	23	0	0	0	0
3	F	22	0	0	0	0
3	G	21	0	0	0	0
3	H	31	0	0	0	0
All	All	3870	0	0	11	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 3.

All (11) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:C:169:ASP:CB	3:D:51:HOH:O	2.57	0.52
2:B:27:ARG:NH1	3:D:211:HOH:O	2.46	0.48
1:A:118:SER:O	1:A:120:GLN:N	2.46	0.48
2:D:24:LYS:NZ	3:D:74:HOH:O	2.47	0.47
1:A:126:THR:OG1	2:B:28:ASP:OD2	2.35	0.44
1:C:139:GLU:CG	1:C:141:PHE:CE2	3.00	0.44
1:E:131:THR:O	1:E:142:HIS:CD2	2.71	0.44
1:C:168:SER:N	3:C:89:HOH:O	2.52	0.42
2:F:30:LEU:CB	2:H:34:GLN:NE2	2.83	0.42
2:H:10:GLY:O	2:H:13:VAL:N	2.54	0.41
1:G:112:TYR:OH	1:G:176:PHE:OXT	2.40	0.40

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	73/79 (92%)	68 (93%)	2 (3%)	3 (4%)	4	1
1	C	73/79 (92%)	68 (93%)	5 (7%)	0	100	100
1	E	73/79 (92%)	70 (96%)	3 (4%)	0	100	100
1	G	73/79 (92%)	70 (96%)	2 (3%)	1 (1%)	16	7
2	B	33/39 (85%)	33 (100%)	0	0	100	100
2	D	34/39 (87%)	33 (97%)	1 (3%)	0	100	100
2	F	30/39 (77%)	30 (100%)	0	0	100	100
2	H	34/39 (87%)	33 (97%)	0	1 (3%)	7	2
All	All	423/472 (90%)	405 (96%)	13 (3%)	5 (1%)	19	9

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	118	SER
1	G	168	SER
2	H	11	SER
1	A	119	GLY
1	A	170	GLY

### 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	65/66 (98%)	59 (91%)	6 (9%)	13	7
1	C	65/66 (98%)	56 (86%)	9 (14%)	5	2
1	E	65/66 (98%)	60 (92%)	5 (8%)	18	11
1	G	65/66 (98%)	58 (89%)	7 (11%)	9	5
2	B	32/34 (94%)	31 (97%)	1 (3%)	52	49
2	D	33/34 (97%)	31 (94%)	2 (6%)	26	19
2	F	29/34 (85%)	24 (83%)	5 (17%)	3	1

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	H	33/34 (97%)	29 (88%)	4 (12%)	7	4
All	All	387/400 (97%)	348 (90%)	39 (10%)	11	6

All (39) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	123	SER
1	A	139	GLU
1	A	144	LEU
1	A	146	GLU
1	A	153	LEU
1	A	156	LEU
2	B	16	GLN
1	C	103	ARG
1	C	105	GLU
1	C	110	LEU
1	C	117	ARG
1	C	121	ASN
1	C	123	SER
1	C	135	ASP
1	C	144	LEU
1	C	150	LEU
2	D	21	LEU
2	D	44	GLU
1	E	105	GLU
1	E	123	SER
1	E	136	THR
1	E	150	LEU
1	E	151	ARG
2	F	13	VAL
2	F	21	LEU
2	F	22	GLN
2	F	27	ARG
2	F	30	LEU
1	G	103	ARG
1	G	127	LEU
1	G	139	GLU
1	G	144	LEU
1	G	150	LEU
1	G	153	LEU
1	G	156	LEU
2	H	11	SER

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Mol	Chain	Res	Type
2	H	21	LEU
2	H	26	GLN
2	H	36	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 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, 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	75/79 (94%)	0.70	5 (6%) 17 17	18, 30, 58, 60	0
1	C	75/79 (94%)	0.80	6 (8%) 12 12	14, 29, 44, 53	0
1	E	75/79 (94%)	0.95	11 (14%) 3 3	18, 34, 55, 61	0
1	G	75/79 (94%)	0.98	7 (9%) 9 8	18, 31, 57, 70	0
2	B	35/39 (89%)	0.51	2 (5%) 23 22	16, 24, 46, 52	0
2	D	36/39 (92%)	0.70	1 (2%) 50 50	13, 20, 54, 61	0
2	F	32/39 (82%)	0.64	3 (9%) 9 8	20, 27, 41, 42	0
2	H	36/39 (92%)	0.74	3 (8%) 11 11	17, 23, 49, 52	0
All	All	439/472 (93%)	0.79	38 (8%) 10 10	13, 29, 54, 70	0

All (38) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	G	169	ASP	8.1
1	E	122	ASN	6.3
1	G	122	ASN	5.7
2	F	33	TYR	5.0
1	A	118	SER	4.8
1	E	103	ARG	4.4
1	E	121	ASN	3.6
1	C	138	ASP	3.6
1	C	122	ASN	3.3
2	F	39	GLN	3.2
1	E	118	SER	3.1
1	G	141	PHE	3.1
2	H	10	GLY	2.8
1	E	169	ASP	2.7
1	E	168	SER	2.7
1	G	168	SER	2.7

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Mol	Chain	Res	Type	RSRZ
1	E	110	LEU	2.6
1	G	167	VAL	2.6
1	G	107	TRP	2.6
1	C	112	TYR	2.6
1	C	133	GLY	2.5
1	G	103	ARG	2.4
2	H	33	TYR	2.3
1	C	103	ARG	2.3
1	A	117	ARG	2.2
1	C	141	PHE	2.2
1	E	150	LEU	2.2
2	B	43	ARG	2.2
1	E	143	GLY	2.2
1	E	144	LEU	2.2
1	A	122	ASN	2.2
1	E	145	ASP	2.1
2	H	42	GLU	2.1
2	F	40	GLN	2.1
1	A	121	ASN	2.1
2	B	44	GLU	2.1
1	A	140	GLU	2.0
2	D	39	GLN	2.0

## 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.