



Full wwPDB X-ray Structure Validation Report

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PDB ID : 4APF
Title : Crystal structure of the human KLHL11-Cul3 complex at 3.1A resolution
Authors : Canning, P.; Cooper, C.D.O.; Krojer, T.; Vollmar, M.; Ugochukwu, E.; Muniz, J.R.C.; Ayinampudi, V.; Savitsky, P.; Arrowsmith, C.H.; Edwards, A.M.; Bountra, C.; Von Delft, F.; Bullock, A.N.; Structural Genomics Consortium (SGC)
Deposited on : 2012-04-02
Resolution : 3.10 Å(reported)

This is a full wwPDB validation 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>

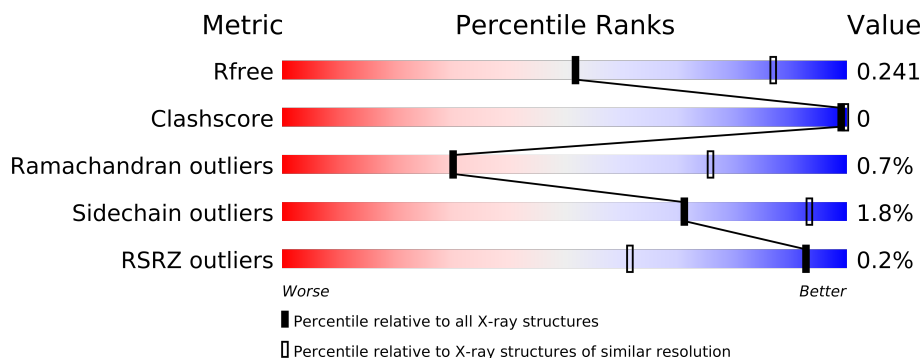
The following versions of software and data (see [references](#)) were used in the production of this report:

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 3.10 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	1007 (3.18-3.02)
Clashscore	79885	1078 (3.16-3.04)
Ramachandran outliers	78287	1044 (3.16-3.04)
Sidechain outliers	78261	1044 (3.16-3.04)
RSRZ outliers	66119	1008 (3.18-3.02)

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	297	
2	B	388	

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 4641 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 KELCH-LIKE PROTEIN 11.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	264	1960	1267	335	347	11	0	0	0

There are 23 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	44	MET	-	EXPRESSION TAG	UNP Q9NVR0
A	45	HIS	-	EXPRESSION TAG	UNP Q9NVR0
A	46	HIS	-	EXPRESSION TAG	UNP Q9NVR0
A	47	HIS	-	EXPRESSION TAG	UNP Q9NVR0
A	48	HIS	-	EXPRESSION TAG	UNP Q9NVR0
A	49	HIS	-	EXPRESSION TAG	UNP Q9NVR0
A	50	HIS	-	EXPRESSION TAG	UNP Q9NVR0
A	51	SER	-	EXPRESSION TAG	UNP Q9NVR0
A	52	SER	-	EXPRESSION TAG	UNP Q9NVR0
A	53	GLY	-	EXPRESSION TAG	UNP Q9NVR0
A	54	VAL	-	EXPRESSION TAG	UNP Q9NVR0
A	55	ASP	-	EXPRESSION TAG	UNP Q9NVR0
A	56	LEU	-	EXPRESSION TAG	UNP Q9NVR0
A	57	GLY	-	EXPRESSION TAG	UNP Q9NVR0
A	58	THR	-	EXPRESSION TAG	UNP Q9NVR0
A	59	GLU	-	EXPRESSION TAG	UNP Q9NVR0
A	60	ASN	-	EXPRESSION TAG	UNP Q9NVR0
A	61	LEU	-	EXPRESSION TAG	UNP Q9NVR0
A	62	TYR	-	EXPRESSION TAG	UNP Q9NVR0
A	63	PHE	-	EXPRESSION TAG	UNP Q9NVR0
A	64	GLN	-	EXPRESSION TAG	UNP Q9NVR0
A	65	SER	-	EXPRESSION TAG	UNP Q9NVR0
A	66	MET	-	EXPRESSION TAG	UNP Q9NVR0

- Molecule 2 is a protein called CULLIN 3.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	341	Total	C	N	O	S	0	1	0
			2671	1691	464	494	22			

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	389	ALA	-	EXPRESSION TAG	UNP Q13618
B	390	GLU	-	EXPRESSION TAG	UNP Q13618
B	391	ASN	-	EXPRESSION TAG	UNP Q13618
B	392	LEU	-	EXPRESSION TAG	UNP Q13618
B	393	TYR	-	EXPRESSION TAG	UNP Q13618
B	394	PHE	-	EXPRESSION TAG	UNP Q13618
B	395	GLN	-	EXPRESSION TAG	UNP Q13618
B	396	SER	-	EXPRESSION TAG	UNP Q13618
B	397	HIS	-	EXPRESSION TAG	UNP Q13618
B	398	HIS	-	EXPRESSION TAG	UNP Q13618
B	399	HIS	-	EXPRESSION TAG	UNP Q13618
B	400	HIS	-	EXPRESSION TAG	UNP Q13618
B	401	HIS	-	EXPRESSION TAG	UNP Q13618
B	402	HIS	-	EXPRESSION TAG	UNP Q13618
B	403	ASP	-	EXPRESSION TAG	UNP Q13618
B	404	TYR	-	EXPRESSION TAG	UNP Q13618
B	405	LYS	-	EXPRESSION TAG	UNP Q13618
B	406	ASP	-	EXPRESSION TAG	UNP Q13618
B	407	ASP	-	EXPRESSION TAG	UNP Q13618
B	408	ASP	-	EXPRESSION TAG	UNP Q13618
B	409	ASP	-	EXPRESSION TAG	UNP Q13618
B	410	LYS	-	EXPRESSION TAG	UNP Q13618
B	342	ARG	ILE	ENGINEERED MUTATION	UNP Q13618
B	346	ASP	LEU	ENGINEERED MUTATION	UNP Q13618

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	4	Total	O	0	0
			4	4		
3	B	6	Total	O	0	0
			6	6		

4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	238.64Å 41.44Å 147.78Å 90.00° 110.20° 90.00°	Depositor
Resolution (Å)	35.88 – 3.10 35.46 – 3.10	Depositor EDS
% Data completeness (in resolution range)	98.3 (35.88-3.10) 98.3 (35.46-3.10)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.93 (at 3.12Å)	Xtriage
Refinement program	BUSTER 2.11.2	Depositor
R, R_{free}	0.193 , 0.222 0.212 , 0.241	Depositor DCC
R_{free} test set	1282 reflections (5.40%)	DCC
Wilson B-factor (Å ²)	106.0	Xtriage
Anisotropy	0.083	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 93.0	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Outliers	0 of 25015 reflections	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	4641	wwPDB-VP
Average B, all atoms (Å ²)	115.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.80% 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	0.51	0/2003	0.67	0/2727
2	B	0.51	0/2715	0.65	0/3663
All	All	0.51	0/4718	0.66	0/6390

There are no bond length outliers.

There are no bond angle outliers.

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	1960	0	0	0	0
2	B	2671	0	0	1	0
3	A	4	0	0	0	0
3	B	6	0	0	0	0
All	All	4641	0	0	1	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 0.

All (1) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
2:B:154:TYR:O	2:B:154:TYR:CG	2.71	0.44

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	260/297 (88%)	238 (92%)	19 (7%)	3 (1%)	19	62
2	B	338/388 (87%)	311 (92%)	26 (8%)	1 (0%)	50	87
All	All	598/685 (87%)	549 (92%)	45 (8%)	4 (1%)	30	76

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	127	SER
1	A	285	PHE
2	B	155	GLY
1	A	128	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	174/264 (66%)	169 (97%)	5 (3%)	55	88
2	B	269/355 (76%)	266 (99%)	3 (1%)	84	96
All	All	443/619 (72%)	435 (98%)	8 (2%)	71	93

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	119	THR
1	A	129	GLN

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Mol	Chain	Res	Type
1	A	186	ILE
1	A	197	LYS
1	A	320	LYS
2	B	127	ASP
2	B	195	LEU
2	B	270	SER

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, 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	264/297 (88%)	-0.29	0	100	100	72, 127, 176, 186	0
2	B	341/388 (87%)	-0.31	1 (0%)	91	53	73, 100, 158, 208	0
All	All	605/685 (88%)	-0.30	1 (0%)	93	61	72, 111, 172, 208	0

All (1) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	328	LEU	2.2

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.