wwPDB X-ray Structure Validation Summary Report (i)

Feb 1, 2016 – 01:43 PM GMT

PDB ID	:	3UQC
Title	:	Structure of the Intracellular Kinase Homology Domain of Rv3910 at 2.2 A resolution
Authors	:	Alber, T.; Gee, C.L.; Blair, S.R.; TB Structural Genomics Consortium (TB-SGC)
Deposited on	:	2011-11-20
Resolution	:	2.26 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
A user guide is available at
http://wwpdb.org/validation/2016/XrayValidationReportHelp
with specific help available everywhere you see the (i) symbol.

The following versions of software and data (see references (1)) were used in the production of this report:

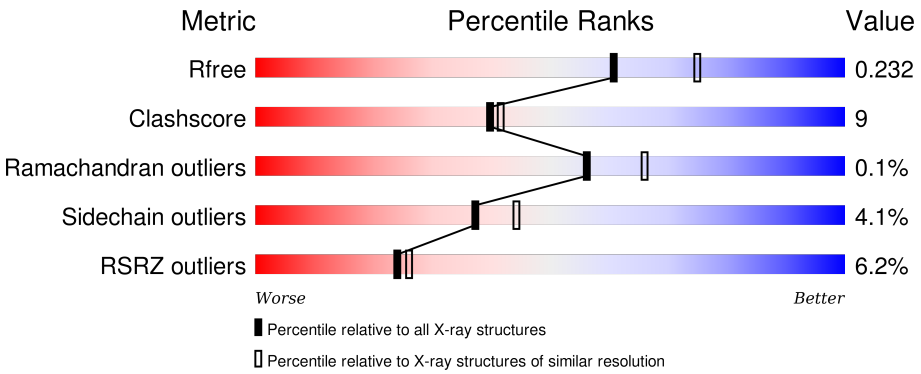
MolProbity	:	4.02b-467
Mogul	:	1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix)	:	1.9-1692
EDS	:	rb-20026688
Percentile statistics	:	20151230.v01 (using entries in the PDB archive December 30th 2015)
Refmac	:	5.8.0135
CCP4	:	6.5.0
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	trunk26865

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.26 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}	91344	1640 (2.28-2.24)
Clashscore	102246	1095 (2.26-2.26)
Ramachandran outliers	100387	1063 (2.26-2.26)
Sidechain outliers	100360	1063 (2.26-2.26)
RSRZ outliers	91569	1647 (2.28-2.24)

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. 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 <=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	286	10%, 67%, 18%, •, 14%
1	B	286	%, 72%, 13%, •, 15%
1	C	286	7%, 70%, 16%, •, 13%
1	D	286	3%, 69%, 18%, 13%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard

residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	SIN	B	301	-	-	-	X

2 Entry composition (i)

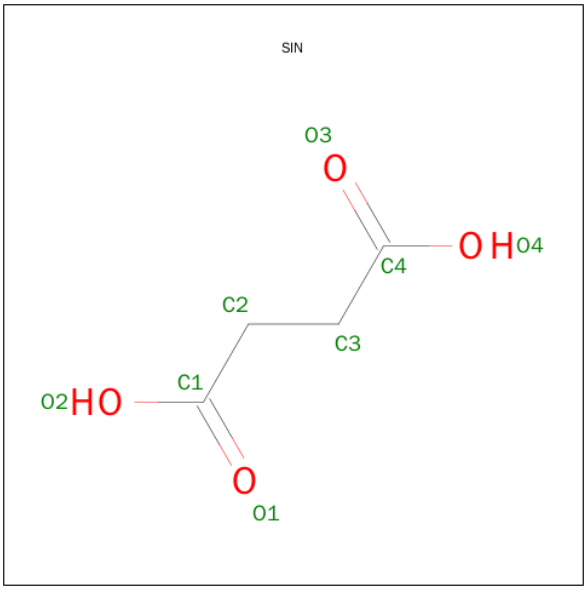
There are 3 unique types of molecules in this entry. The entry contains 7711 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 PROBABLE CONSERVED TRANSMEMBRANE PROTEIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	246	1828	1144	339	342	3	31	0	0
1	B	244	1823	1140	337	342	4	21	1	0
1	C	250	1870	1167	345	355	3	35	2	0
1	D	249	1856	1160	342	351	3	51	1	0

- Molecule 2 is SUCCINIC ACID (three-letter code: SIN) (formula: $C_4H_6O_4$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
2	B	1	8	4	4	0	0

- Molecule 3 is water.

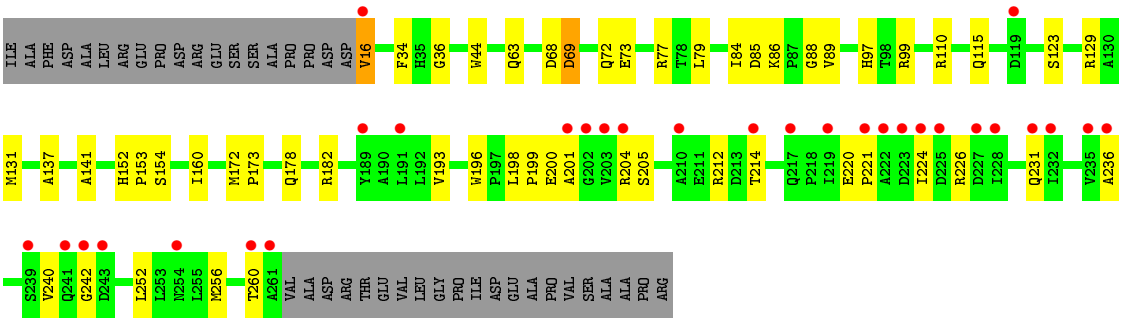
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
3	A	54	54	54	0	0
			Total	O		
3	B	136	136	136	0	0
			Total	O		
3	C	86	86	86	0	0
			Total	O		
3	D	50	50	50	0	0

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 (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.

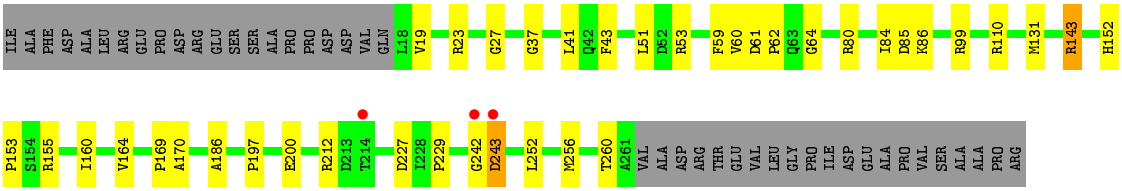
- Molecule 1: PROBABLE CONSERVED TRANSMEMBRANE PROTEIN

Chain A:



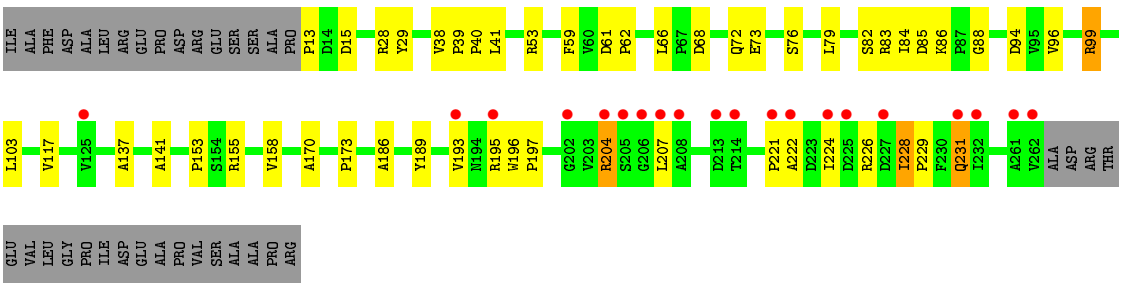
- Molecule 1: PROBABLE CONSERVED TRANSMEMBRANE PROTEIN

Chain B:



- Molecule 1: PROBABLE CONSERVED TRANSMEMBRANE PROTEIN

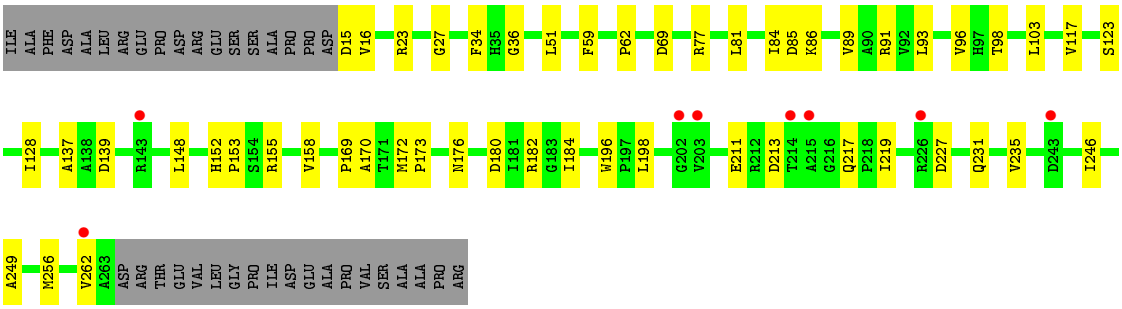
Chain C:



- Molecule 1: PROBABLE CONSERVED TRANSMEMBRANE PROTEIN

Chain D:

3%
69%
18%
13%


ILE ALA PHE ASP ALA LEU ARG GLU PRO ASP ARG GLU SER SER ALA PRO PRO ASP D15 V16 R23 G27 F34 H35 G36 L51 F59 P62 D69 R77 L81 I84 D85 K86 V89 A90 R91 V92 L93 V96 H97 T98 L103 V117 S123
I128 A137 A138 D139 R143 L148 H152 P153 S154 R155 V158 P169 A170 T171 M172 P173 N176 D180 I181 R182 G183 I184 W196 P197 L198 G202 V203 E211 R212 D213 T214 A215 G216 Q217 P218 I219 R226 D227 Q231 V235 D243 I246
A249 M256 V262 A263 ASP ARG THR GLU VAL LEU GLY PRO ILE ASP GLU ALA PRO VAL SER ALA ALA PRO ARG

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	57.97Å 59.38Å 144.03Å 90.00° 97.34° 90.00°	Depositor
Resolution (Å)	47.88 – 2.26 47.88 – 2.26	Depositor EDS
% Data completeness (in resolution range)	99.7 (47.88-2.26) 99.8 (47.88-2.26)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.08	Depositor
$< I/\sigma(I) >$ [1]	1.53 (at 2.24Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.7_650)	Depositor
R, R_{free}	0.199 , 0.240 0.196 , 0.232	Depositor DCC
R_{free} test set	2345 reflections (5.37%)	DCC
Wilson B-factor (Å^2)	32.8	Xtriage
Anisotropy	0.525	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.35 , 59.4	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Outliers	0 of 46014 reflections	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	7711	wwPDB-VP
Average B, all atoms (Å^2)	41.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.79% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.375 respectively for untwinned datasets, and 0.333, 0.2 for perfectly twinned datasets.

5 Model quality (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: SIN

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	0.23	0/1862	0.47	0/2545
1	B	0.26	0/1857	0.53	0/2537
1	C	0.24	0/1904	0.51	1/2603 (0.0%)
1	D	0.24	0/1893	0.50	0/2588
All	All	0.24	0/7516	0.50	1/10273 (0.0%)

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
1	B	0	1
1	D	0	1
All	All	0	3

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	C	13	PRO	N-CA-CB	5.89	110.36	103.30

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	199	PRO	Peptide
1	B	169	PRO	Peptide

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Mol	Chain	Res	Type	Group
1	D	169	PRO	Peptide

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	1828	0	1848	43	1
1	B	1823	0	1841	24	1
1	C	1870	0	1874	33	0
1	D	1856	0	1872	29	0
2	B	8	0	4	1	0
3	A	54	0	0	2	0
3	B	136	0	0	1	0
3	C	86	0	0	1	0
3	D	50	0	0	1	0
All	All	7711	0	7439	128	1

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 9.

The worst 5 of 128 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:200:GLU:HG3	1:A:201:ALA:H	1.25	1.02
1:B:143:ARG:HH11	1:B:143:ARG:HG3	1.36	0.90
1:A:200:GLU:HG3	1:A:201:ALA:N	1.94	0.82
1:B:143:ARG:HH11	1:B:143:ARG:CG	1.93	0.81
1:B:227:ASP:O	1:B:229:PRO:HD3	1.84	0.77

All (1) 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:226:ARG:NE	1:B:227:ASP:OD1[1_545]	2.14	0.06

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	244/286 (85%)	234 (96%)	10 (4%)	0	100	100
1	B	243/286 (85%)	239 (98%)	3 (1%)	1 (0%)	39	43
1	C	250/286 (87%)	239 (96%)	11 (4%)	0	100	100
1	D	248/286 (87%)	243 (98%)	5 (2%)	0	100	100
All	All	985/1144 (86%)	955 (97%)	29 (3%)	1 (0%)	56	66

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	243	ASP

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	189/222 (85%)	182 (96%)	7 (4%)	41	50
1	B	189/222 (85%)	182 (96%)	7 (4%)	41	50
1	C	194/222 (87%)	182 (94%)	12 (6%)	23	22
1	D	193/222 (87%)	187 (97%)	6 (3%)	47	58
All	All	765/888 (86%)	733 (96%)	32 (4%)	37	42

5 of 32 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	38	VAL
1	C	76[B]	SER
1	D	98	THR
1	C	76[A]	SER
1	C	79	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	241	GLN

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 carbohydrates in this entry.

5.6 Ligand geometry (i)

1 ligand is modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the chemical component dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
2	SIN	B	301	-	1,7,7	0.15	0	2,8,8	1.68	1 (50%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral

centers analysed, the number of these observed in the model and the number defined in the chemical component dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	SIN	B	301	-	-	0/1/5/5	0/0/0/0

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	301	SIN	C3-C2-C1	-2.14	108.83	112.75

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	301	SIN	1	0

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 (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, 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	246/286 (86%)	0.59	30 (12%)	5	5	25, 47, 81, 104	7 (2%)
1	B	244/286 (85%)	-0.00	3 (1%)	81	83	18, 29, 50, 91	4 (1%)
1	C	250/286 (87%)	0.38	20 (8%)	15	16	18, 39, 71, 91	7 (2%)
1	D	249/286 (87%)	0.23	8 (3%)	51	56	23, 42, 65, 87	10 (4%)
All	All	989/1144 (86%)	0.30	61 (6%)	24	26	18, 38, 75, 104	28 (2%)

The worst 5 of 61 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	243	ASP	6.1
1	B	242	GLY	5.2
1	C	214	THR	5.0
1	A	222	ALA	4.6
1	A	232	ILE	4.6

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 carbohydrates in this entry.

6.4 Ligands (i)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors

of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(Å^2)	Q<0.9
2	SIN	B	301	8/8	0.73	0.21	4.14	27,34,39,39	0

6.5 Other polymers (i)

There are no such residues in this entry.