wwPDB X-ray Structure Validation Summary Report (i)

Aug 15, 2023 – 03:04 AM EDT

PDB ID	:	1U5G
Title	:	Crystal Structure of the PH Domain of SKAP-Hom
Authors	:	Tang, Y.; Swanson, K.; Neel, B.G.; Eck, M.J.
Deposited on	:	2004-07-27
Resolution	:	2.10 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
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the (i) symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

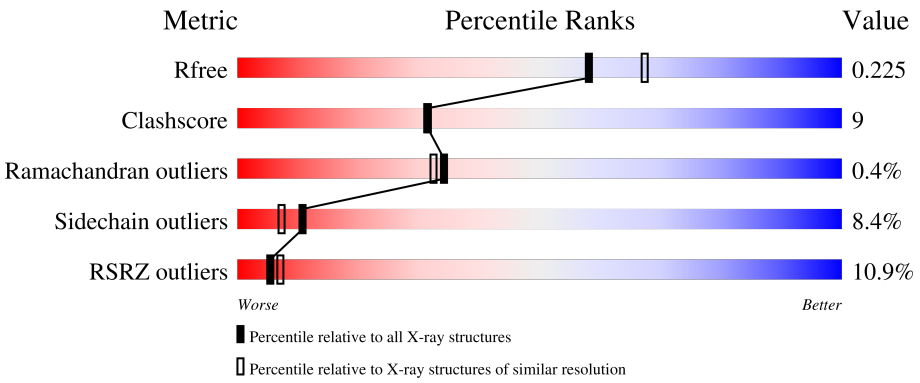
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.35
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35

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 2.10 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}	130704	5197 (2.10-2.10)
Clashscore	141614	5710 (2.10-2.10)
Ramachandran outliers	138981	5647 (2.10-2.10)
Sidechain outliers	138945	5648 (2.10-2.10)
RSRZ outliers	127900	5083 (2.10-2.10)

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 >=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 <=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	122	16% 67% 20% 7% 6%
1	B	122	2% 64% 26% 5% • •
1	C	122	2% 63% 29% • • •
1	D	122	22% 64% 24% 6% • 6%

2 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 4091 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 Src-associated adaptor protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	115	959	620	163	171	5	0	0	0
1	B	118	980	632	166	177	5	0	0	0
1	C	118	980	632	166	177	5	0	0	0
1	D	115	959	620	163	171	5	0	0	0

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	101	GLY	SER	engineered mutation	UNP Q8BK74
A	102	SER	ASP	engineered mutation	UNP Q8BK74
B	101	GLY	SER	engineered mutation	UNP Q8BK74
B	102	SER	ASP	engineered mutation	UNP Q8BK74
C	101	GLY	SER	engineered mutation	UNP Q8BK74
C	102	SER	ASP	engineered mutation	UNP Q8BK74
D	101	GLY	SER	engineered mutation	UNP Q8BK74
D	102	SER	ASP	engineered mutation	UNP Q8BK74

- Molecule 2 is water.

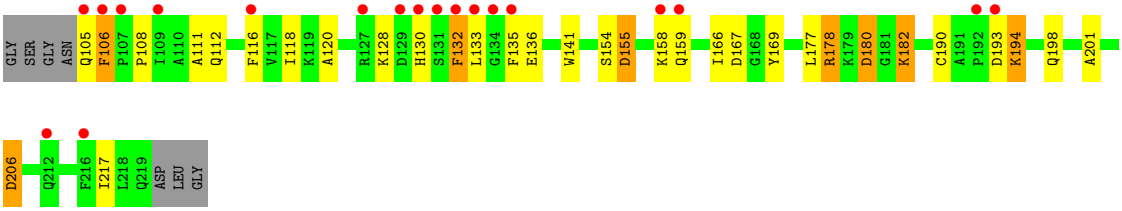
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
2	A	23	23	23	0	0
2	B	82	82	82	0	0
2	C	88	88	88	0	0
2	D	20	20	20	0	0

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.

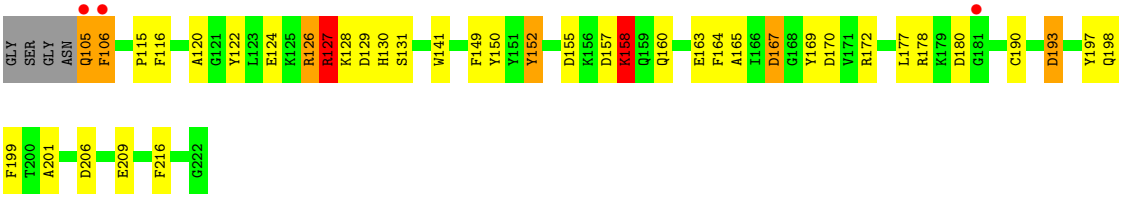
• Molecule 1: Src-associated adaptor protein

Chain A:



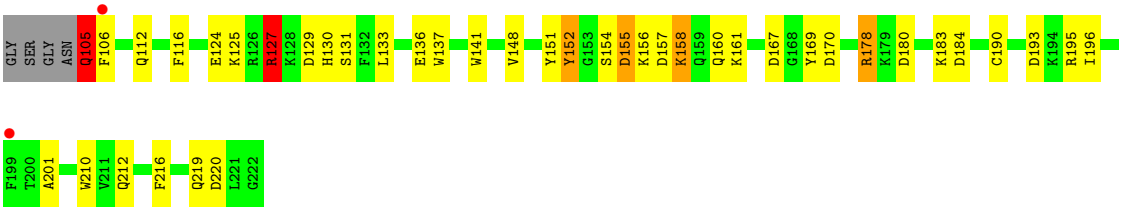
• Molecule 1: Src-associated adaptor protein

Chain B:



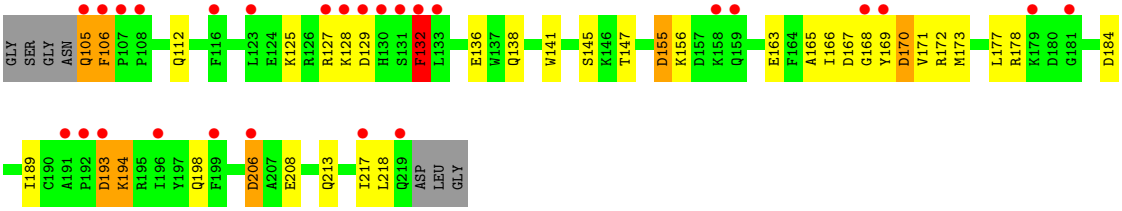
• Molecule 1: Src-associated adaptor protein

Chain C:



• Molecule 1: Src-associated adaptor protein

Chain D:


GLY
SER
GLY
ASN
Q105
F106
P107
P108
Q112
F116
L123
E124
K125
R126
R127
K128
D129
H130
S131
F132
L133
E136
W137
Q138
W141
S145
K146
T147
D155
K156
D157
K158
Q159
E163
F164
A165
I166
D167
G168
Y169
D170
V171
R172
M173
L177
R178
K179
D180
G181
D184
I189
C190
A191
P192
D193
K194
R195
I196
Y197
Q198
F199
D206
A207
E208
Q213
I217
L218
Q219
ASP
LEU
GLY

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	59.61Å 65.69Å 143.77Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	25.00 – 2.10 24.67 – 2.10	Depositor EDS
% Data completeness (in resolution range)	99.4 (25.00-2.10) 99.5 (24.67-2.10)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.77 (at 2.10Å)	Xtriage
Refinement program	REFMAC 5.1.19	Depositor
R, R_{free}	0.213 , 0.271 0.220 , 0.225	Depositor DCC
R_{free} test set	1702 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å^2)	24.9	Xtriage
Anisotropy	0.302	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.35 , 58.2	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	4091	wwPDB-VP
Average B, all atoms (Å^2)	46.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 32.44 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 9.3921e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

[1]Intensities estimated from amplitudes.

[2]Theoretical values of $< |L| >$, $< L^2 >$ 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	1.41	2/985 (0.2%)	1.20	7/1323 (0.5%)
1	B	1.77	17/1006 (1.7%)	1.60	14/1350 (1.0%)
1	C	1.81	24/1006 (2.4%)	1.48	12/1350 (0.9%)
1	D	1.24	0/985	1.18	7/1323 (0.5%)
All	All	1.58	43/3982 (1.1%)	1.38	40/5346 (0.7%)

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	C	0	1
1	D	0	1
All	All	0	3

The worst 5 of 43 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	115	PRO	N-CD	8.89	1.60	1.47
1	B	199	PHE	CD2-CE2	-8.11	1.23	1.39
1	C	127	ARG	CD-NE	-8.03	1.32	1.46
1	C	152	TYR	CG-CD1	7.99	1.49	1.39
1	B	127	ARG	CD-NE	-7.62	1.33	1.46

The worst 5 of 40 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	127	ARG	NE-CZ-NH1	22.46	131.53	120.30
1	B	127	ARG	NE-CZ-NH2	-18.21	111.20	120.30
1	C	127	ARG	NE-CZ-NH2	-16.46	112.07	120.30
1	C	127	ARG	NE-CZ-NH1	14.64	127.62	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	167	ASP	CB-CG-OD2	10.71	127.94	118.30

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	105	GLN	Peptide
1	C	105	GLN	Mainchain
1	D	132	PHE	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	959	0	938	15	0
1	B	980	0	956	16	0
1	C	980	0	956	16	0
1	D	959	0	938	23	0
2	A	23	0	0	2	0
2	B	82	0	0	3	0
2	C	88	0	0	3	0
2	D	20	0	0	1	0
All	All	4091	0	3788	69	0

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 69 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:C:105:GLN:HE21	1:C:105:GLN:N	1.08	1.43
1:C:105:GLN:N	1:C:105:GLN:NE2	1.66	1.41
1:C:105:GLN:HE21	1:C:105:GLN:CA	1.37	1.34
1:D:206:ASP:HB3	2:D:237:HOH:O	1.53	1.06
1:A:106:PHE:HB2	2:A:243:HOH:O	1.62	0.98

There are no symmetry-related clashes.

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	113/122 (93%)	104 (92%)	8 (7%)	1 (1%)	17 12
1	B	116/122 (95%)	113 (97%)	3 (3%)	0	100 100
1	C	116/122 (95%)	113 (97%)	3 (3%)	0	100 100
1	D	113/122 (93%)	99 (88%)	13 (12%)	1 (1%)	17 12
All	All	458/488 (94%)	429 (94%)	27 (6%)	2 (0%)	34 32

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	116	PHE
1	D	106	PHE

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	100/104 (96%)	93 (93%)	7 (7%)	15 12
1	B	102/104 (98%)	93 (91%)	9 (9%)	10 6
1	C	102/104 (98%)	97 (95%)	5 (5%)	25 23
1	D	100/104 (96%)	87 (87%)	13 (13%)	4 2
All	All	404/416 (97%)	370 (92%)	34 (8%)	11 7

5 of 34 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	145	SER
1	D	163	GLU
1	D	194	LYS
1	B	128	LYS
1	B	127	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 6 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	138	GLN
1	D	198	GLN
1	D	213	GLN
1	C	219	GLN
1	C	105	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 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)

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	115/122 (94%)	1.04	19 (16%)	1	2	34, 54, 84, 101	0
1	B	118/122 (96%)	0.05	3 (2%)	57	62	25, 34, 52, 68	0
1	C	118/122 (96%)	-0.01	2 (1%)	70	74	24, 31, 47, 60	0
1	D	115/122 (94%)	1.29	27 (23%)	0	0	39, 59, 87, 100	0
All	All	466/488 (95%)	0.58	51 (10%)	5	7	24, 44, 80, 101	0

The worst 5 of 51 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	133	LEU	14.5
1	A	130	HIS	8.3
1	A	135	PHE	7.3
1	D	192	PRO	7.0
1	D	133	LEU	6.5

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.