WORLDWIDE PDB PROTEIN DATA BANK

wwPDB X-ray Structure Validation Summary Report (i)

May 21, 2020 – 03:07 am BST

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PDB ID	:	3LYV
Title	:	Crystal structure of a domain of ribosome-associated factor Y from streptococcus pyogenes serotype M6. Northeast Structural Genomics Consortium target id DR64A
Authors	:	Seetharaman, J.; Neely, H.; Forouhar, F.; Wang, D.; Janjua, H.; Cunningham, K.; Owens, L.; Xiao, R.; Liu, J.; Baran, M.C.; Acton, T.B.; Montelione, G.T.; Hunt, J.F.; Tong, L.; Northeast Structural Genomics Consortium (NESG)
Deposited on	:	2010-02-28
Resolution	:	2.70 Å(reported)

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 2.70 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.
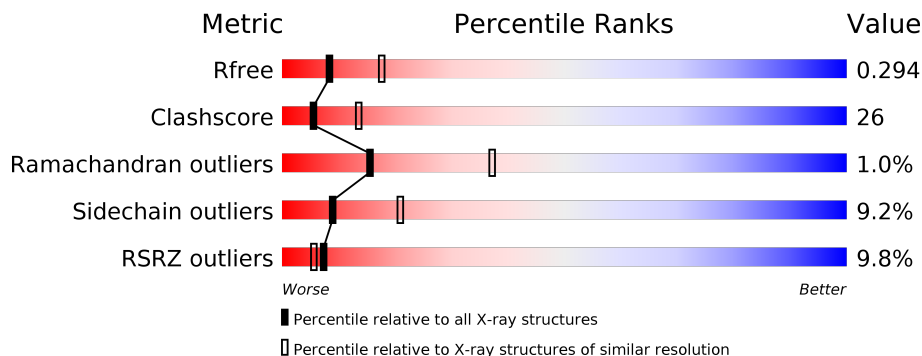
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	2808 (2.70-2.70)
Clashscore	141614	3122 (2.70-2.70)
Ramachandran outliers	138981	3069 (2.70-2.70)
Sidechain outliers	138945	3069 (2.70-2.70)
RSRZ outliers	127900	2737 (2.70-2.70)

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 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	66	2% 50% 32% 9% 9%
1	B	66	52% 36% 12%
1	C	66	5% 48% 39% 12%
1	D	66	3% 42% 23% 5% 30%
1	E	66	24% 38% 35% • 24%
1	F	66	12% 38% 30% 6% 26%

2 Entry composition (i)

There is only 1 type of molecule in this entry. The entry contains 2599 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 Ribosome-associated factor Y.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	60	Total 484	C 303	N 82	O 96	Se 3	0	0	0
1	B	58	Total 467	C 293	N 80	O 92	Se 2	0	0	0
1	C	58	Total 467	C 293	N 80	O 92	Se 2	0	0	0
1	D	46	Total 371	C 235	N 62	O 72	Se 2	0	0	0
1	E	50	Total 413	C 262	N 71	O 77	Se 3	0	0	0
1	F	49	Total 397	C 253	N 70	O 72	Se 2	0	0	0

There are 54 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MSE	-	INITIATING METHIONINE	UNP Q5XAQ7
A	59	LEU	-	EXPRESSION TAG	UNP Q5XAQ7
A	60	GLU	-	EXPRESSION TAG	UNP Q5XAQ7
A	61	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
A	62	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
A	63	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
A	64	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
A	65	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
A	66	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
B	1	MSE	-	INITIATING METHIONINE	UNP Q5XAQ7
B	59	LEU	-	EXPRESSION TAG	UNP Q5XAQ7
B	60	GLU	-	EXPRESSION TAG	UNP Q5XAQ7
B	61	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
B	62	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
B	63	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
B	64	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
B	65	HIS	-	EXPRESSION TAG	UNP Q5XAQ7

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| Chain	Residue	Modelled	Actual	Comment	Reference
B	66	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
C	1	MSE	-	INITIATING METHIONINE	UNP Q5XAQ7
C	59	LEU	-	EXPRESSION TAG	UNP Q5XAQ7
C	60	GLU	-	EXPRESSION TAG	UNP Q5XAQ7
C	61	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
C	62	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
C	63	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
C	64	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
C	65	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
C	66	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
D	1	MSE	-	INITIATING METHIONINE	UNP Q5XAQ7
D	59	LEU	-	EXPRESSION TAG	UNP Q5XAQ7
D	60	GLU	-	EXPRESSION TAG	UNP Q5XAQ7
D	61	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
D	62	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
D	63	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
D	64	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
D	65	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
D	66	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
E	1	MSE	-	INITIATING METHIONINE	UNP Q5XAQ7
E	59	LEU	-	EXPRESSION TAG	UNP Q5XAQ7
E	60	GLU	-	EXPRESSION TAG	UNP Q5XAQ7
E	61	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
E	62	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
E	63	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
E	64	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
E	65	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
E	66	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
F	1	MSE	-	INITIATING METHIONINE	UNP Q5XAQ7
F	59	LEU	-	EXPRESSION TAG	UNP Q5XAQ7
F	60	GLU	-	EXPRESSION TAG	UNP Q5XAQ7
F	61	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
F	62	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
F	63	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
F	64	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
F	65	HIS	-	EXPRESSION TAG	UNP Q5XAQ7
F	66	HIS	-	EXPRESSION TAG	UNP Q5XAQ7

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 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: Ribosome-associated factor Y
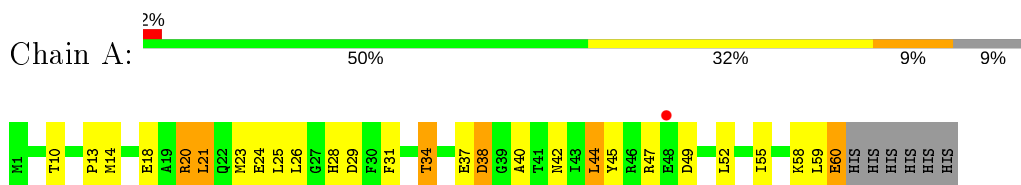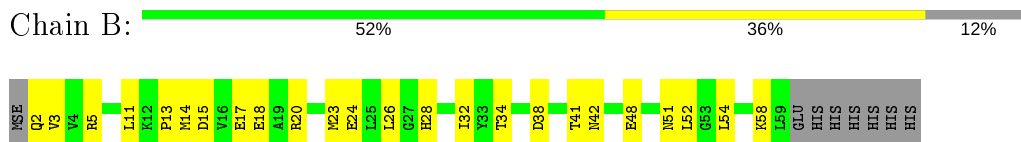
- Molecule 1: Ribosome-associated factor Y

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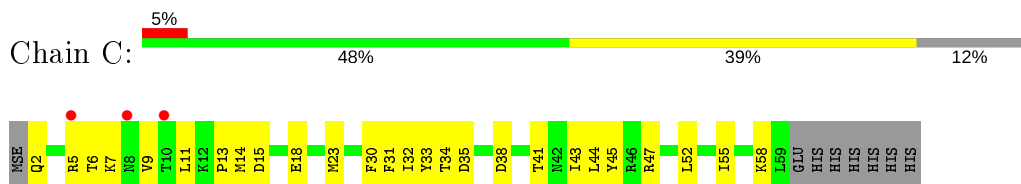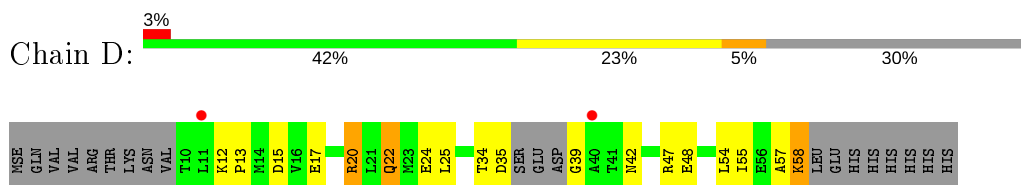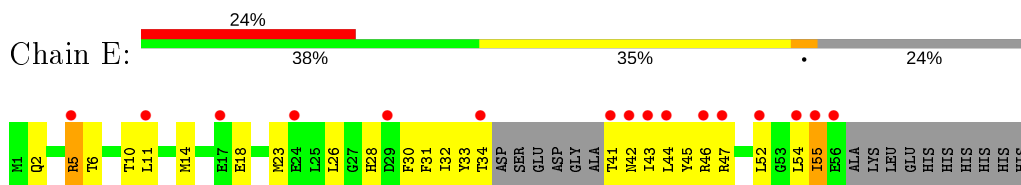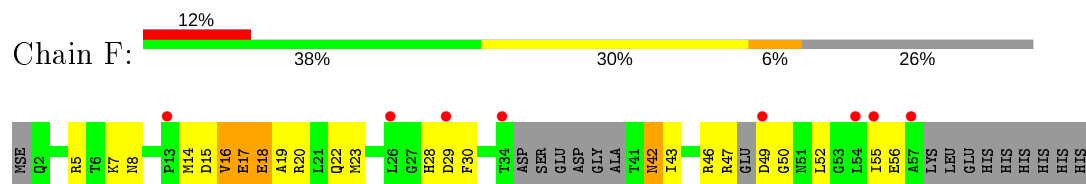- Molecule 1: Ribosome-associated factor Y

- Molecule 1: Ribosome-associated factor Y

- Molecule 1: Ribosome-associated factor Y

Chain F:

12%

38%   30%   6%   26%

MSE Q2 R5 T6 K7 N8 P13 M14 D15 V16 E17 E18 A19 R20 L21 Q22 M23 L26 G27 H28 D29 F30 T34 ASP SER GLU ASP GLY ALA T41 N42 I43 R46 R47 GLU D49 G50 N51 L52 G53 L54 I55 E56 A57 LYS LEU GLU HIS HIS HIS HIS HIS HIS

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	51.60Å 64.68Å 69.56Å 90.00° 96.60° 90.00°	Depositor
Resolution (Å)	47.22 – 2.70 47.22 – 2.60	Depositor EDS
% Data completeness (in resolution range)	97.3 (47.22-2.70) 98.6 (47.22-2.60)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	0.06	Depositor
$<I/\sigma(I)>$ [1]	5.34 (at 2.61Å)	Xtriage
Refinement program	CNS 1.2	Depositor
R, R_{free}	0.244 , 0.284 0.257 , 0.294	Depositor DCC
R_{free} test set	1335 reflections (4.86%)	wwPDB-VP
Wilson B-factor (Å^2)	50.6	Xtriage
Anisotropy	0.301	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.36 , 55.1	EDS
L-test for twinning[2]	$<|L|> = 0.49$, $<L^2> = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.90	EDS
Total number of atoms	2599	wwPDB-VP
Average B, all atoms (Å^2)	59.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 9.17% of the height of the origin peak. No significant pseudotranslation is detected.*

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[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.

wwPDB X-ray Structure Validation Summary Report

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	0.48	0/487	0.69	0/651
1	B	0.47	0/470	0.64	0/629
1	C	0.41	0/470	0.61	0/629
1	D	0.39	0/373	0.57	0/496
1	E	0.37	0/415	0.56	0/553
1	F	0.48	0/398	0.60	0/529
All	All	0.44	0/2613	0.62	0/3487

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-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 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	484	0	483	27	0
1	B	467	0	465	18	0
1	C	467	0	465	28	0
1	D	371	0	364	22	0
1	E	413	0	420	30	0
1	F	397	0	403	27	0
All	All	2599	0	2600	134	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 26.

The worst 5 of 134 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:D:35:ASP:HB2	1:D:42:ASN:ND2	1.73	1.02
1:F:16:VAL:HG13	1:F:17:GLU:H	1.24	0.99
1:C:11:LEU:HD21	1:C:32:ILE:HG12	1.49	0.95
1:A:23:MSE:HE1	1:A:44:LEU:HB3	1.52	0.90
1:F:16:VAL:HG13	1:F:17:GLU:N	1.86	0.90

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	58/66 (88%)	54 (93%)	4 (7%)	0	100	100
1	B	56/66 (85%)	54 (96%)	2 (4%)	0	100	100
1	C	56/66 (85%)	50 (89%)	5 (9%)	1 (2%)	8	21
1	D	42/66 (64%)	41 (98%)	1 (2%)	0	100	100
1	E	46/66 (70%)	40 (87%)	6 (13%)	0	100	100
1	F	43/66 (65%)	37 (86%)	4 (9%)	2 (5%)	2	4
All	All	301/396 (76%)	276 (92%)	22 (7%)	3 (1%)	15	37

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	F	16	VAL
1	F	50	GLY
1	C	5	ARG

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	53/56 (95%)	45 (85%)	8 (15%)	3	7
1	B	51/56 (91%)	45 (88%)	6 (12%)	5	12
1	C	51/56 (91%)	50 (98%)	1 (2%)	55	81
1	D	39/56 (70%)	35 (90%)	4 (10%)	7	16
1	E	46/56 (82%)	44 (96%)	2 (4%)	29	57
1	F	43/56 (77%)	38 (88%)	5 (12%)	5	12
All	All	283/336 (84%)	257 (91%)	26 (9%)	9	21

5 of 26 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	38	ASP
1	C	41	THR
1	F	30	PHE
1	B	48	GLU
1	B	58	LYS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 13 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	42	ASN
1	C	51	ASN
1	E	28	HIS
1	C	2	GLN
1	E	2	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)

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	57/66 (86%)	0.39	1 (1%)	68	70	28, 46, 75, 84	0
1	B	56/66 (84%)	0.13	0	100	100	28, 46, 61, 71	0
1	C	56/66 (84%)	0.55	3 (5%)	25	24	31, 52, 77, 82	0
1	D	44/66 (66%)	0.66	2 (4%)	33	31	40, 62, 83, 89	0
1	E	47/66 (71%)	1.40	16 (34%)	0	0	49, 70, 94, 101	0
1	F	47/66 (71%)	1.03	8 (17%)	1	1	46, 75, 93, 97	0
All	All	307/396 (77%)	0.66	30 (9%)	7	5	28, 55, 91, 101	0

The worst 5 of 30 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	34	THR	6.1
1	D	40	ALA	5.4
1	F	13	PRO	5.1
1	E	52	LEU	5.1
1	E	47	ARG	4.5

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 carbohydrates 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.