Full wwPDB X-ray Structure Validation Report (i)

Jun 11, 2024 – 10:19 PM EDT

PDB ID	:	1LU4
Title	:	1.1 ANGSTROM RESOLUTION CRYSTAL STRUCTURE OF A SECRETED MYCOBACTERIUM TUBERCULOSIS DISULFIDE OXIDOREDUCTASE HOMOLOGOUS TO E. COLI DSBE: IMPLICATIONS FOR FUNCTIONS
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Deposited on	:	2002-05-21
Resolution	:	1.12 Å(reported)

This is a Full wwPDB X-ray Structure Validation 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 (i)) were used in the production of this report:

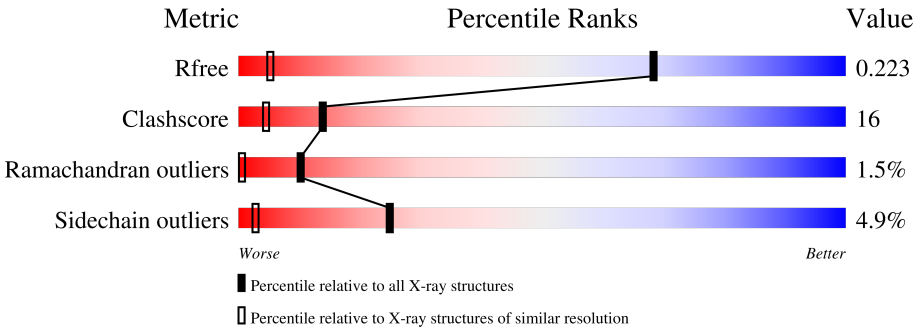
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.20.1
EDS	:	2.36.2
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36.2

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 1.12 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	1168 (1.14-1.10)
Clashscore	141614	1205 (1.14-1.10)
Ramachandran outliers	138981	1168 (1.14-1.10)
Sidechain outliers	138945	1165 (1.14-1.10)

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%

Mol	Chain	Length	Quality of chain
1	A	136	77% 14% 6%

2 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 1397 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 SOLUBLE SECRETED ANTIGEN MPT53.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	134	Total	C	N	O	S	0	7	0
			1076	696	179	197	4			

- Molecule 2 is water.

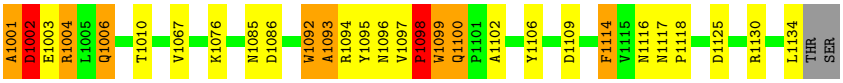
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	321	Total	O	0	0
			321	321		

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. 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. 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: SOLUBLE SECRETED ANTIGEN MPT53

Chain A:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α, β, γ	60.64Å 60.64Å 79.78Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	10.00 – 1.12 19.99 – 1.12	Depositor EDS
% Data completeness (in resolution range)	94.0 (10.00-1.12) 97.2 (19.99-1.12)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.07 (at 1.12Å)	Xtriage
Refinement program	SHELXL-97	Depositor
R, R_{free}	0.152 , 0.216 0.208 , 0.223	Depositor DCC
R_{free} test set	2843 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å^2)	9.5	Xtriage
Anisotropy	0.231	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.32 , 55.8	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	1397	wwPDB-VP
Average B, all atoms (Å^2)	21.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.61% 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, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

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	1.15	6/1124 (0.5%)	2.35	45/1546 (2.9%)

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	1093	ALA	N-CA	19.83	1.86	1.46
1	A	1134	LEU	C-O	14.05	1.50	1.23
1	A	1099[A]	TRP	CD1-NE1	-6.59	1.26	1.38
1	A	1099[B]	TRP	CD1-NE1	-6.59	1.26	1.38
1	A	1099[A]	TRP	CG-CD1	-6.12	1.28	1.36
1	A	1099[B]	TRP	CG-CD1	-6.12	1.28	1.36

All (45) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	1099[A]	TRP	CG-CD1-NE1	27.41	137.51	110.10
1	A	1099[B]	TRP	CG-CD1-NE1	27.41	137.51	110.10
1	A	1099[A]	TRP	CD1-NE1-CE2	-20.04	90.97	109.00
1	A	1099[B]	TRP	CD1-NE1-CE2	-20.04	90.97	109.00
1	A	1099[A]	TRP	CD1-CG-CD2	-18.48	91.52	106.30
1	A	1099[B]	TRP	CD1-CG-CD2	-18.48	91.52	106.30
1	A	1098[A]	PRO	CA-C-N	17.95	156.70	117.20
1	A	1098[B]	PRO	CA-C-N	17.95	156.70	117.20
1	A	1098[A]	PRO	O-C-N	-16.33	96.58	122.70
1	A	1098[B]	PRO	O-C-N	-16.33	96.58	122.70
1	A	1134	LEU	CA-C-O	-15.30	87.97	120.10
1	A	1004	ARG	NE-CZ-NH2	10.35	125.47	120.30
1	A	1001	ALA	CB-CA-C	9.14	123.81	110.10
1	A	1092[A]	TRP	CA-C-O	8.87	138.73	120.10
1	A	1092[B]	TRP	CA-C-O	8.87	138.73	120.10
1	A	1004	ARG	NE-CZ-NH1	-8.39	116.11	120.30
1	A	1001	ALA	O-C-N	8.15	135.75	122.70
1	A	1130	ARG	NE-CZ-NH1	7.85	124.22	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	1130	ARG	NE-CZ-NH2	-7.43	116.59	120.30
1	A	1099[A]	TRP	C-N-CA	7.42	140.25	121.70
1	A	1099[B]	TRP	C-N-CA	7.42	140.25	121.70
1	A	1098[A]	PRO	N-CA-C	-7.18	93.43	112.10
1	A	1098[B]	PRO	N-CA-C	-7.18	93.43	112.10
1	A	1114[A]	PHE	CZ-CE2-CD2	-7.14	111.53	120.10
1	A	1114[B]	PHE	CZ-CE2-CD2	-7.14	111.53	120.10
1	A	1094	ARG	NE-CZ-NH2	-6.88	116.86	120.30
1	A	1099[A]	TRP	CB-CG-CD1	6.85	135.91	127.00
1	A	1099[B]	TRP	CB-CG-CD1	6.85	135.91	127.00
1	A	1002	ASP	CB-CG-OD1	6.78	124.40	118.30
1	A	1094	ARG	NE-CZ-NH1	6.71	123.66	120.30
1	A	1117	ASN	N-CA-CB	-6.70	98.55	110.60
1	A	1093	ALA	CB-CA-C	6.12	119.27	110.10
1	A	1092[A]	TRP	O-C-N	-6.02	113.06	122.70
1	A	1092[B]	TRP	O-C-N	-6.02	113.06	122.70
1	A	1095	TYR	O-C-N	5.89	132.12	122.70
1	A	1125	ASP	CB-CG-OD1	5.81	123.53	118.30
1	A	1098[A]	PRO	CA-C-O	-5.71	106.50	120.20
1	A	1098[B]	PRO	CA-C-O	-5.71	106.50	120.20
1	A	1109	ASP	CB-CG-OD1	5.57	123.31	118.30
1	A	1099[A]	TRP	CA-C-N	5.41	129.10	117.20
1	A	1099[B]	TRP	CA-C-N	5.41	129.10	117.20
1	A	1095	TYR	CB-CG-CD1	-5.16	117.91	121.00
1	A	1094	ARG	CD-NE-CZ	5.15	130.81	123.60
1	A	1114[A]	PHE	CB-CA-C	5.04	120.49	110.40
1	A	1114[B]	PHE	CB-CA-C	5.04	120.49	110.40

There are no chirality outliers.

There are no planarity outliers.

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	1076	0	1006	33	0
2	A	321	0	0	6	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	1397	0	1006	33	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 16.

All (33) 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:1114[B]:PHE:CZ	1:A:1116:ASN:HB2	1.20	1.60
1:A:1114[B]:PHE:CZ	1:A:1116:ASN:CB	2.05	1.38
1:A:1093:ALA:CA	1:A:1093:ALA:N	1.86	1.36
1:A:1114[B]:PHE:CE2	1:A:1116:ASN:CB	2.24	1.21
1:A:1114[B]:PHE:CE2	1:A:1116:ASN:HB2	1.81	1.15
1:A:1114[B]:PHE:CE2	1:A:1116:ASN:HB3	1.89	1.04
1:A:1114[B]:PHE:HE2	1:A:1116:ASN:HB3	1.30	0.94
1:A:1114[B]:PHE:HZ	1:A:1116:ASN:CB	1.65	0.83
1:A:1114[B]:PHE:HZ	1:A:1116:ASN:HB2	0.99	0.79
1:A:1118:PRO:HG3	2:A:9096:HOH:O	1.86	0.76
1:A:1001:ALA:N	1:A:1106:TYR:HH	1.91	0.69
1:A:1098[A]:PRO:HD3	2:A:9228:HOH:O	1.92	0.68
1:A:1001:ALA:N	1:A:1004:ARG:HE	1.92	0.67
1:A:1001:ALA:HA	1:A:1106:TYR:HE1	1.58	0.67
1:A:1001:ALA:N	1:A:1004:ARG:HH21	1.99	0.61
1:A:1093:ALA:N	1:A:1093:ALA:C	2.53	0.59
1:A:1092[A]:TRP:CD1	1:A:1097[A]:VAL:HB	2.44	0.52
1:A:1086:ASP:OD2	1:A:1092[B]:TRP:HD1	1.93	0.52
1:A:1114[B]:PHE:HZ	1:A:1116:ASN:CG	2.11	0.52
1:A:1003:GLU:O	1:A:1006:GLN:HG3	2.15	0.47
1:A:1092[A]:TRP:HE1	1:A:1097[A]:VAL:HG12	1.79	0.47
1:A:1003:GLU:HG3	1:A:1006:GLN:HG3	1.96	0.47
1:A:1067:VAL:HG22	1:A:1085:ASN:ND2	2.32	0.45
1:A:1006:GLN:NE2	2:A:9301:HOH:O	2.50	0.45
1:A:1076:LYS:NZ	2:A:9151:HOH:O	2.50	0.44
1:A:1098[A]:PRO:HD2	1:A:1116:ASN:ND2	2.34	0.43
1:A:1010:THR:HG21	2:A:9245:HOH:O	2.18	0.42
1:A:1092[A]:TRP:CZ2	1:A:1098[A]:PRO:O	2.72	0.42
1:A:1092[B]:TRP:HH2	1:A:1100[B]:GLN:HG2	1.04	0.42
1:A:1006:GLN:HE21	1:A:1006:GLN:HB3	1.46	0.41
1:A:1098[B]:PRO:HB2	1:A:1102:ALA:HB2	2.02	0.41
1:A:1067:VAL:HG23	2:A:9164:HOH:O	2.20	0.40

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	139/136 (102%)	133 (96%)	3 (2%)	3 (2%)	6 0

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1096[A]	ASN
1	A	1096[B]	ASN
1	A	1002	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	110/106 (104%)	102 (93%)	8 (7%)	14 1

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

Mol	Chain	Res	Type
1	A	1002	ASP
1	A	1006	GLN
1	A	1098[A]	PRO
1	A	1098[B]	PRO
1	A	1099[A]	TRP

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Mol	Chain	Res	Type
1	A	1099[B]	TRP
1	A	1100[A]	GLN
1	A	1100[B]	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	1006	GLN
1	A	1023	GLN
1	A	1040	ASN
1	A	1116	ASN

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

6.1 Protein, DNA and RNA chains

Unable to reproduce the depositors R factor - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains

Unable to reproduce the depositors R factor - this section is therefore empty.

6.3 Carbohydrates

Unable to reproduce the depositors R factor - this section is therefore empty.

6.4 Ligands

Unable to reproduce the depositors R factor - this section is therefore empty.

6.5 Other polymers

Unable to reproduce the depositors R factor - this section is therefore empty.