



# wwPDB X-ray Structure Validation Summary Report ⓘ

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PDB ID : 5L3F  
Title : LSD1-CoREST1 in complex with polymyxin B  
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Deposited on : 2016-04-10  
Resolution : 3.50 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](mailto:validation@mail.wwpdb.org)

A user guide is available at

<http://wwpdb.org/validation/2016/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467  
Mogul : 1.7.1 (RC1), CSD as537be (2016)  
Xtriage (Phenix) : 1.9-1692  
EDS : rb-20027939  
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) : rb-20027939

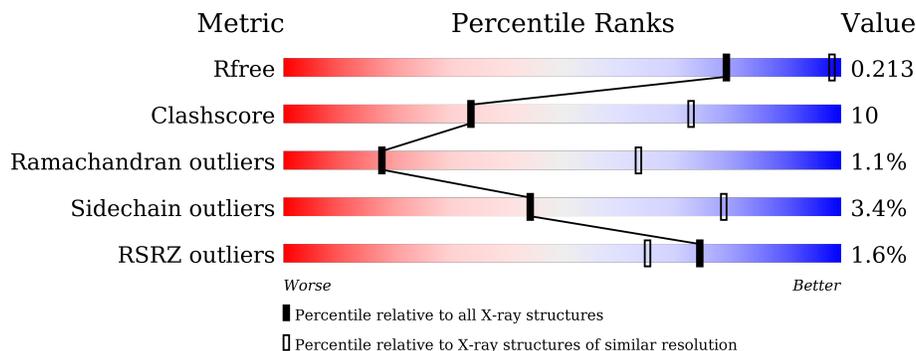
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.50 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	1051 (3.60-3.40)
Clashscore	102246	1157 (3.60-3.40)
Ramachandran outliers	100387	1120 (3.60-3.40)
Sidechain outliers	100360	1121 (3.60-3.40)
RSRZ outliers	91569	1058 (3.60-3.40)

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  $\geq 3$ , 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  $\leq 5\%$ . 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	730	
2	B	178	
3	C	11	

## 2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 6431 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 Lysine-specific histone demethylase 1A.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	666	5217	3324	906	967	20	0	0	0

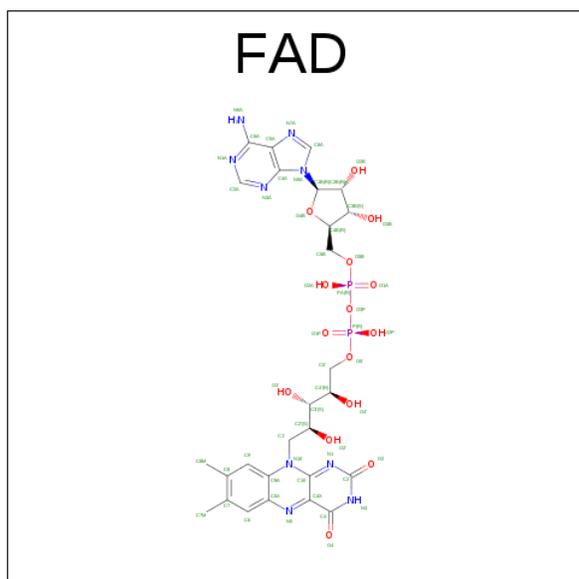
- Molecule 2 is a protein called REST corepressor 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	133	1076	676	194	203	3	0	0	0

- Molecule 3 is a protein called Polmyxin B.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	C	11	85	56	16	13	15	0	0

- Molecule 4 is FLAVIN-ADENINE DINUCLEOTIDE (three-letter code: FAD) (formula:  $C_{27}H_{33}N_9O_{15}P_2$ ).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
4	A	1	53	27	9	15	2	0	0





## 4 Data and refinement statistics

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	119.20Å 179.00Å 235.78Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.23 – 3.50 49.23 – 3.50	Depositor EDS
% Data completeness (in resolution range)	99.8 (49.23-3.50) 99.9 (49.23-3.50)	Depositor EDS
$R_{merge}$	0.16	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.48 (at 3.48Å)	Xtrriage
Refinement program	PHENIX (phenix.refine: 1.8.4_1496)	Depositor
R, $R_{free}$	0.186 , 0.210 0.188 , 0.213	Depositor DCC
$R_{free}$ test set	636 reflections (1.98%)	DCC
Wilson B-factor (Å <sup>2</sup> )	109.9	Xtrriage
Anisotropy	0.648	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 106.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.44$ , $\langle L^2 \rangle = 0.27$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	6431	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	123.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.51% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  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](#)

Bond lengths and bond angles in the following residue types are not validated in this section: 4FO, DTH, DAB, FAD, 6FH

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	0.62	0/5331	0.63	0/7232
2	B	0.45	0/1091	0.52	0/1471
3	C	2.31	1/19 (5.3%)	1.20	0/24
All	All	0.61	1/6441 (0.0%)	0.61	0/8727

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

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	7	PHE	CB-CG	-6.56	1.40	1.51

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	792	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	5217	0	5252	120	0
2	B	1076	0	1091	15	0
3	C	85	0	54	5	0
4	A	53	0	29	8	0
All	All	6431	0	6426	131	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 10.

The worst 5 of 131 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:331:ALA:HA	4:A:901:FAD:N5	2.01	0.76
1:A:280:LYS:N	1:A:619:ASP:OD2	2.20	0.70
1:A:667:ASP:HB3	1:A:744:LYS:HD2	1.76	0.68
1:A:335:THR:OG1	1:A:335:THR:O	2.13	0.65
1:A:537:GLU:HG3	1:A:544:LEU:HG	1.80	0.62

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	664/730 (91%)	604 (91%)	53 (8%)	7 (1%)	17	63
2	B	131/178 (74%)	126 (96%)	3 (2%)	2 (2%)	13	56
3	C	2/11 (18%)	1 (50%)	1 (50%)	0	100	100
All	All	797/919 (87%)	731 (92%)	57 (7%)	9 (1%)	17	63

5 of 9 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	316	ARG
1	A	402	ASN
1	A	401	LEU
1	A	809	ALA
1	A	785	SER

### 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	566/623 (91%)	547 (97%)	19 (3%)	44	79
2	B	117/156 (75%)	113 (97%)	4 (3%)	44	79
3	C	2/2 (100%)	2 (100%)	0	100	100
All	All	685/781 (88%)	662 (97%)	23 (3%)	44	79

5 of 23 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	564	HIS
1	A	588	THR
2	B	415	VAL
1	A	571	TYR
1	A	647	LYS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	383	ASN
1	A	632	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](#)

8 non-standard protein/DNA/RNA residues are 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
3	DAB	C	10	3	4,6,7	0.55	0	3,6,8	1.25	1 (33%)
3	DTH	C	11	3	5,6,7	0.52	0	5,7,9	1.84	1 (20%)
3	4FO	C	2	3	4,6,7	0.49	0	3,6,8	1.07	0
3	DTH	C	3	3	5,6,7	0.54	0	5,7,9	1.14	1 (20%)
3	4FO	C	4	3	4,6,7	0.49	0	3,6,8	1.12	0
3	4FO	C	5	3	4,6,7	0.43	0	3,6,8	1.39	1 (33%)
3	DAB	C	6	3	4,6,7	0.58	0	3,6,8	1.00	0
3	DAB	C	9	3	4,6,7	0.41	0	3,6,8	1.04	0

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
3	DAB	C	10	3	-	0/3/5/7	0/0/0/0
3	DTH	C	11	3	-	0/4/6/8	0/0/0/0
3	4FO	C	2	3	-	0/3/5/7	0/0/0/0
3	DTH	C	3	3	-	0/4/6/8	0/0/0/0
3	4FO	C	4	3	-	0/3/5/7	0/0/0/0
3	4FO	C	5	3	-	0/3/5/7	0/0/0/0
3	DAB	C	6	3	-	0/3/5/7	0/0/0/0
3	DAB	C	9	3	-	0/3/5/7	0/0/0/0

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	11	DTH	O-C-CA	-3.29	116.71	125.69
3	C	5	4FO	O-C-CA	-2.35	119.43	125.72

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Mol	Chain	Res	Type	Atoms	Z	Observed( $^{\circ}$ )	Ideal( $^{\circ}$ )
3	C	3	DTH	O-C-CA	-2.16	119.78	125.69
3	C	10	DAB	O-C-CA	-2.14	119.98	125.72

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	11	DTH	1	0
3	C	5	4FO	1	0
3	C	9	DAB	1	0

## 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	$\# Z  > 2$
4	FAD	A	901	-	52,58,58	3.75	20 (38%)	52,89,89	2.71	15 (28%)

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
4	FAD	A	901	-	-	0/30/50/50	0/6/6/6

The worst 5 of 20 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	901	FAD	C2B-C1B	-15.70	1.28	1.53
4	A	901	FAD	O4B-C4B	-6.02	1.31	1.45
4	A	901	FAD	O2'-C2'	-3.97	1.34	1.43
4	A	901	FAD	O3B-C3B	-3.48	1.34	1.43
4	A	901	FAD	C6-C5X	-2.51	1.37	1.41

The worst 5 of 15 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	901	FAD	N3A-C2A-N1A	-12.31	119.20	128.87
4	A	901	FAD	N6A-C6A-N1A	-6.60	107.44	118.52
4	A	901	FAD	N3-C2-N1	-4.02	120.92	127.69
4	A	901	FAD	C4B-O4B-C1B	-3.77	105.65	109.64
4	A	901	FAD	C7M-C7-C6	-3.26	111.12	120.33

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 8 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	901	FAD	8	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, 95<sup>th</sup> 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 <sup>2</sup> )	Q < 0.9
1	A	666/730 (91%)	-0.18	3 (0%) 91 88	76, 110, 162, 239	0
2	B	133/178 (74%)	0.30	10 (7%) 17 14	113, 153, 208, 294	0
3	C	2/11 (18%)	-0.56	0 100 100	176, 176, 176, 182	0
All	All	801/919 (87%)	-0.10	13 (1%) 74 65	76, 117, 178, 294	0

The worst 5 of 13 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	171	PRO	4.1
2	B	323	ALA	3.4
2	B	308	ARG	3.3
2	B	312	LYS	3.2
2	B	324	VAL	2.7

### 6.2 Non-standard residues in protein, DNA, RNA chains [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, 95<sup>th</sup> 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 <sup>2</sup> )	Q < 0.9
3	DAB	C	9	7/8	0.78	0.36	-	183,185,190,191	0
3	DAB	C	10	7/8	0.90	0.33	-	177,185,193,197	0
3	DTH	C	3	7/8	0.87	0.22	-	188,192,195,198	0
3	4FO	C	2	7/8	0.71	0.44	-	186,187,189,189	5
3	DAB	C	6	7/8	0.90	0.29	-	187,188,190,196	0
3	DTH	C	11	7/8	0.89	0.30	-	195,196,197,198	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
3	4FO	C	5	7/8	0.78	0.27	-	190,193,198,199	0
3	4FO	C	4	7/8	0.90	0.21	-	189,194,197,197	0

### 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, 95<sup>th</sup> 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( $\text{\AA}^2$ )	Q<0.9
4	FAD	A	901	53/53	0.95	0.24	-0.20	60,86,99,109	0

### 6.5 Other polymers [i](#)

There are no such residues in this entry.