



# wwPDB X-ray Structure Validation Summary Report

Feb 20, 2024 – 09:24 AM EST

PDB ID : 4L0Z  
Title : Crystal structure of Runx1 and Ets1 bound to TCR alpha promoter (crystal form 2)  
Authors : Tahirov, T.H.  
Deposited on : 2013-06-01  
Resolution : 2.70 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

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the  symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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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  
Xtriage (Phenix) : 1.13  
EDS : 2.36  
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

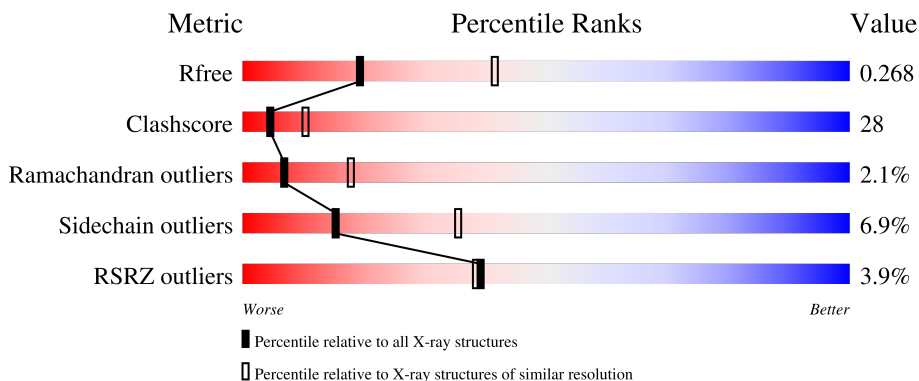
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 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 of the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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  $\leq 5\%$ . 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	242	 4% 32% 27% 39%
2	B	146	 31% 35% 31%
3	C	16	 12% 75% 12%
4	D	16	 38% 56% 6%

## 2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 2670 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 Runt-related transcription factor 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	147	1142	714	212	211	5	0	0	0

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	36	ALA	GLY	conflict	UNP Q03347
A	38	ALA	PRO	conflict	UNP Q03347
A	42	GLY	SER	conflict	UNP Q03347

- Molecule 2 is a protein called Protein C-ets-1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	101	851	550	147	150	4	0	0	0

- Molecule 3 is a DNA chain called 5'-D(\*GP\*GP\*AP\*AP\*GP\*CP\*CP\*AP\*CP\*AP\*TP\*C  
P\*CP\*TP\*CP\*T)-3'.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
3	C	16	321	154	59	93	15	0	0	0

- Molecule 4 is a DNA chain called 5'-D(\*CP\*AP\*GP\*AP\*GP\*GP\*AP\*TP\*GP\*TP\*GP\*G  
P\*CP\*TP\*TP\*C)-3'.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
4	D	16	329	157	62	95	15	0	0	0

- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	6	Total O 6 6	0	0
5	B	7	Total O 7 7	0	0
5	C	7	Total O 7 7	0	0
5	D	7	Total O 7 7	0	0



C101	A102	G103	A104	G105	G109	T110	G111	G112	C113	T114	T115	C116
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## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	87.34Å 100.14Å 67.22Å 90.00° 120.49° 90.00°	Depositor
Resolution (Å)	29.63 – 2.70 29.63 – 2.70	Depositor EDS
% Data completeness (in resolution range)	96.5 (29.63-2.70) 96.4 (29.63-2.70)	Depositor EDS
$R_{merge}$	0.04	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	10.14 (at 2.68Å)	Xtrriage
Refinement program	CNS	Depositor
R, $R_{free}$	0.220 , 0.272 0.218 , 0.268	Depositor DCC
$R_{free}$ test set	687 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	47.0	Xtrriage
Anisotropy	0.048	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.32 , 62.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	2670	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	61.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.95% 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](#)

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	0.41	0/1163	0.63	0/1577
2	B	0.39	0/875	0.61	0/1178
3	C	0.51	0/359	0.82	0/551
4	D	0.46	0/369	0.76	0/569
All	All	0.43	0/2766	0.67	0/3875

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
3	C	0	2
4	D	0	1
All	All	0	3

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
3	C	5	DG	Sidechain
3	C	6	DC	Sidechain
4	D	105	DG	Sidechain

### 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	1142	0	1151	55	0
2	B	851	0	841	53	0
3	C	321	0	181	22	0
4	D	329	0	182	17	0
5	A	6	0	0	0	0
5	B	7	0	0	2	0
5	C	7	0	0	0	0
5	D	7	0	0	0	0
All	All	2670	0	2355	137	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 28.

The worst 5 of 137 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:87:ILE:HD12	1:A:87:ILE:O	1.64	0.96
4:D:104:DA:H2''	4:D:105:DG:C5'	1.95	0.96
4:D:104:DA:H2''	4:D:105:DG:H5''	1.47	0.94
1:A:192:LEU:HD23	1:A:192:LEU:H	1.35	0.90
3:C:14:DT:H2''	3:C:15:DC:H5''	1.50	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	143/242 (59%)	131 (92%)	10 (7%)	2 (1%)	11 28
2	B	99/146 (68%)	82 (83%)	14 (14%)	3 (3%)	4 10
All	All	242/388 (62%)	213 (88%)	24 (10%)	5 (2%)	7 18

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	204	LEU
2	B	351	GLN
2	B	348	LYS
2	B	399	LYS
1	A	206	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	126/205 (62%)	116 (92%)	10 (8%)	12	28
2	B	91/127 (72%)	86 (94%)	5 (6%)	21	46
All	All	217/332 (65%)	202 (93%)	15 (7%)	15	35

5 of 15 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	162	TYR
2	B	398	ASP
1	A	192	LEU
2	B	400	ASN
2	B	369	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	126	ASN
1	A	132	ASN
2	B	351	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, 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	147/242 (60%)	0.22	9 (6%) 21 20	20, 64, 109, 126	0
2	B	101/146 (69%)	0.08	2 (1%) 65 67	28, 64, 96, 110	0
3	C	16/16 (100%)	-0.40	0 100 100	26, 44, 82, 95	0
4	D	16/16 (100%)	-0.78	0 100 100	27, 43, 58, 61	0
All	All	280/420 (66%)	0.08	11 (3%) 39 38	20, 61, 103, 126	0

The worst 5 of 11 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	211	VAL	4.0
1	A	95	GLY	3.9
1	A	210	ARG	3.9
1	A	96	ASP	3.1
1	A	209	MET	3.1

### 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.