Full wwPDB X-ray Structure Validation Report (i)

Jan 28, 2024 – 02:44 PM EST

PDB ID	:	1DSZ
Title	:	STRUCTURE OF THE RXR/RAR DNA-BINDING DOMAIN HETERODIMER IN COMPLEX WITH THE RETINOIC ACID RESPONSE ELEMENT DR1
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Deposited on	:	2000-01-10
Resolution	:	1.70 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:

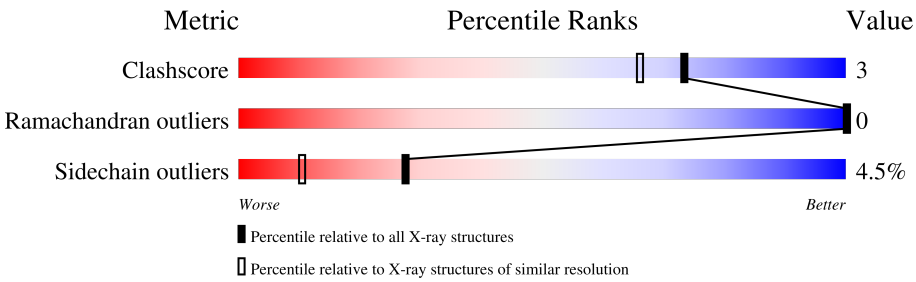
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 1.70 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))
Clashscore	141614	4695 (1.70-1.70)
Ramachandran outliers	138981	4610 (1.70-1.70)
Sidechain outliers	138945	4610 (1.70-1.70)

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 >=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%

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	C	15	47% 53%
2	D	15	33% 67%
3	A	86	72% 15% 13%
4	B	85	82% 16% •

2 Entry composition (i)

There are 6 unique types of molecules in this entry. The entry contains 2193 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 DNA chain called DNA (5'-D(*CP*AP*GP*GP*TP*CP*AP*AP*AP*GP*GP*TP*CP*AP*G)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
1	C	15	309	147	63	85	14	0	0	0

- Molecule 2 is a DNA chain called DNA (5'-D(*CP*TP*GP*AP*CP*CP*TP*TP*TP*GP*AP*CP*CP*TP*G)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
2	D	15	300	145	50	91	14	0	0	0

- Molecule 3 is a protein called RETINOIC ACID RECEPTOR ALPHA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	A	75	575	353	107	104	11	0	0	0

- Molecule 4 is a protein called RETINOIC ACID RECEPTOR RXR-ALPHA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	B	84	667	407	130	119	11	0	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	1228	GLY	-	insertion	UNP P19793

- Molecule 5 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Zn		
5	A	2	2	2	0	0
			Total	Zn		
5	B	2	2	2	0	0

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
6	C	66	66	66	0	0
			Total	O		
6	D	74	74	74	0	0
			Total	O		
6	A	57	57	57	0	0
			Total	O		
6	B	141	141	141	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. 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.

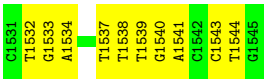
Note EDS was not executed.

• Molecule 1: DNA (5'-D(*CP*AP*GP*GP*TP*CP*AP*AP*AP*GP*GP*TP*CP*AP*G)-3')

Chain C: 47% 53%

• Molecule 2: DNA (5'-D(*CP*TP*GP*AP*CP*CP*TP*TP*TP*GP*AP*CP*CP*TP*G)-3')

Chain D: 33% 67%



• Molecule 3: RETINOIC ACID RECEPTOR ALPHA

Chain A: 72% 15% 13%

• Molecule 4: RETINOIC ACID RECEPTOR RXR-ALPHA

Chain B: 82% 16%

4 Data and refinement statistics (i)

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	80.66Å 33.90Å 101.86Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 1.70	Depositor
% Data completeness (in resolution range)	(Not available) (20.00-1.70)	Depositor
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	CNS	Depositor
R, R_{free}	0.198 , 0.267	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	2193	wwPDB-VP
Average B, all atoms ($Å^2$)	21.0	wwPDB-VP

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: ZN

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	C	0.86	0/348	1.92	12/536 (2.2%)
2	D	0.83	0/334	2.02	14/513 (2.7%)
3	A	0.38	0/584	1.03	4/779 (0.5%)
4	B	0.57	0/676	1.41	8/896 (0.9%)
All	All	0.64	0/1942	1.57	38/2724 (1.4%)

There are no bond length outliers.

All (38) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	B	1302	ARG	NE-CZ-NH1	12.66	126.63	120.30
4	B	1302	ARG	CD-NE-CZ	10.46	138.24	123.60
3	A	1161	ARG	NE-CZ-NH1	9.30	124.95	120.30
4	B	1289	TYR	CB-CG-CD2	9.00	126.40	121.00
2	D	1538	DT	N3-C2-O2	-8.24	117.36	122.30
1	C	1502	DA	O4'-C1'-N9	7.78	113.45	108.00
2	D	1540	DG	N1-C6-O6	7.73	124.54	119.90
2	D	1541	DA	O4'-C1'-N9	-7.64	102.65	108.00
1	C	1505	DG	N3-C4-C5	7.47	132.33	128.60
1	C	1499	DT	O4'-C1'-N1	-7.38	102.84	108.00
2	D	1532	DT	O4'-C1'-N1	-7.24	102.93	108.00
2	D	1539	DT	O4'-C1'-N1	-7.13	103.01	108.00
2	D	1538	DT	O4'-C1'-N1	-7.09	103.04	108.00
4	B	1302	ARG	NE-CZ-NH2	-6.94	116.83	120.30
1	C	1503	DA	C2-N3-C4	6.77	113.99	110.60
1	C	1503	DA	N1-C2-N3	-6.70	125.95	129.30
3	A	1161	ARG	CD-NE-CZ	6.62	132.87	123.60
4	B	1247	TYR	CB-CG-CD1	6.54	124.93	121.00
2	D	1544	DT	C6-C5-C7	6.27	126.66	122.90
1	C	1505	DG	C2-N3-C4	-6.20	108.80	111.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	B	1261	ARG	NE-CZ-NH2	-6.07	117.27	120.30
3	A	1206	ARG	NE-CZ-NH2	-5.90	117.35	120.30
4	B	1291	ARG	NE-CZ-NH1	5.86	123.23	120.30
2	D	1537	DT	C6-N1-C2	-5.73	118.44	121.30
1	C	1496	DA	O4'-C1'-N9	-5.73	103.99	108.00
1	C	1505	DG	N3-C4-N9	-5.62	122.63	126.00
1	C	1496	DA	OP1-P-OP2	-5.58	111.23	119.60
1	C	1497	DG	C5-C6-O6	5.52	131.91	128.60
2	D	1540	DG	O5'-P-OP2	5.48	117.28	110.70
3	A	1161	ARG	NE-CZ-NH2	-5.48	117.56	120.30
2	D	1534	DA	C2-N3-C4	5.44	113.32	110.60
4	B	1250	TYR	CB-CG-CD1	-5.39	117.77	121.00
2	D	1533	DG	N1-C6-O6	-5.36	116.68	119.90
1	C	1498	DG	O4'-C1'-N9	-5.33	104.27	108.00
2	D	1534	DA	N1-C2-N3	-5.20	126.70	129.30
1	C	1508	DA	O4'-C1'-N9	-5.18	104.37	108.00
2	D	1543	DC	C1'-O4'-C4'	-5.14	104.96	110.10
2	D	1544	DT	O4'-C1'-N1	-5.08	104.45	108.00

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	C	309	0	169	0	0
2	D	300	0	172	0	0
3	A	575	0	533	6	0
4	B	667	0	643	7	0
5	A	2	0	0	0	0
5	B	2	0	0	0	0
6	A	57	0	0	1	0
6	B	141	0	0	3	0
6	C	66	0	0	1	0
6	D	74	0	0	1	0
All	All	2193	0	1517	11	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 3.

All (11) 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)
6:D:2126:HOH:O	4:B:1311:ARG:CB	2.30	0.78
3:A:1194:LYS:HA	6:A:2297:HOH:O	1.94	0.66
3:A:1194:LYS:O	3:A:1198:VAL:HG22	1.96	0.65
6:C:2262:HOH:O	4:B:1233:HIS:HE1	1.89	0.54
4:B:1275:LYS:HE3	6:B:2170:HOH:O	2.10	0.51
3:A:1187:CYS:HA	4:B:1311:ARG:O	2.14	0.48
4:B:1232:LYS:HD3	6:B:2317:HOH:O	2.13	0.48
4:B:1281:LYS:NZ	6:B:2335:HOH:O	2.48	0.46
3:A:1188:GLN:HG3	4:B:1311:ARG:C	2.37	0.45
3:A:1146:HIS:CD2	3:A:1156:LYS:HD2	2.56	0.41
3:A:1175:LYS:HG2	3:A:1189:TYR:CE2	2.57	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	
3	A	73/86 (85%)	72 (99%)	1 (1%)	0	100	100
4	B	82/85 (96%)	78 (95%)	4 (5%)	0	100	100
All	All	155/171 (91%)	150 (97%)	5 (3%)	0	100	100

There are no Ramachandran outliers to report.

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
3	A	62/80 (78%)	59 (95%)	3 (5%)	25 9
4	B	70/74 (95%)	67 (96%)	3 (4%)	29 11
All	All	132/154 (86%)	126 (96%)	6 (4%)	27 10

All (6) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	A	1165	LYS
3	A	1176	ASN
3	A	1178	ILE
4	B	1274	ASN
4	B	1278	LEU
4	B	1282	ARG

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

Mol	Chain	Res	Type
3	A	1146	HIS
4	B	1233	HIS
4	B	1288	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)

Of 4 ligands modelled in this entry, 4 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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)

EDS was not executed - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains (i)

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates (i)

EDS was not executed - this section is therefore empty.

6.4 Ligands (i)

EDS was not executed - this section is therefore empty.

6.5 Other polymers (i)

EDS was not executed - this section is therefore empty.