



# Full wwPDB X-ray Structure Validation Report ⓘ

Sep 27, 2017 – 01:03 PM EDT

PDB ID : 1QTW  
Title : HIGH-RESOLUTION CRYSTAL STRUCTURE OF THE ESCHERICHIA COLI DNA REPAIR ENZYME ENDONUCLEASE IV  
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Deposited on : unknown  
Resolution : 1.02 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](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  
Xtriage (Phenix) : **NOT EXECUTED**  
EDS : **NOT EXECUTED**  
Percentile statistics : 20161228.v01 (using entries in the PDB archive December 28th 2016)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : rb-20030345

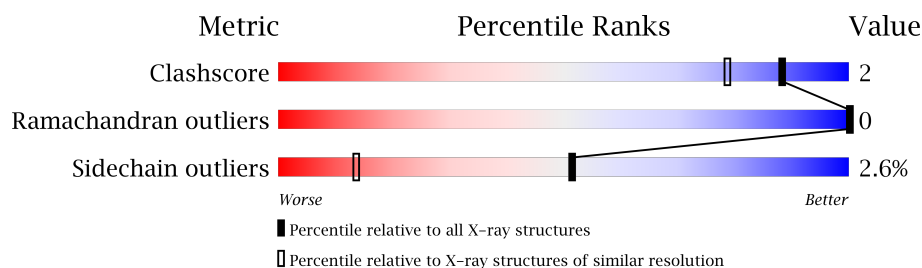
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.02 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	112137	1404 (1.10-0.94)
Ramachandran outliers	110173	1318 (1.10-0.94)
Sidechain outliers	110143	1317 (1.10-0.94)

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.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	285	 86% 13%

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 4768 atoms, of which 2168 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 ENDONUCLEASE IV.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	285	Total	C	H	N	O	S	0	6	0
			4398	1400	2168	393	424	13			

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	3	Total	Zn	0	0
			3	3		

- Molecule 3 is water.

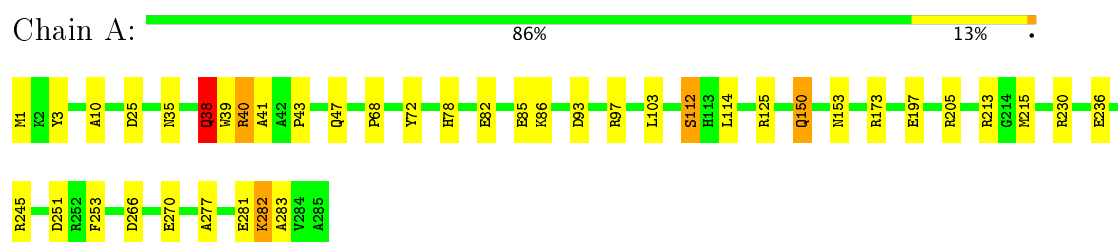
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	367	Total	O	0	0
			367	367		

### 3 Residue-property plots [i](#)

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.

Note EDS was not executed.

#### • Molecule 1: ENDONUCLEASE IV



## 4 Data and refinement statistics

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

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	49.62 Å 59.56 Å 50.98 Å 90.00° 110.94° 90.00°	Depositor
Resolution (Å)	20.00 – 1.02	Depositor
% Data completeness (in resolution range)	(Not available) (20.00-1.02)	Depositor
$R_{merge}$	0.04	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	SHELXL-97	Depositor
R, $R_{free}$	0.124 , 0.148	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	4768	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	19.0	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	A	0.81	3/2309 (0.1%)	1.31	31/3121 (1.0%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	112[A]	SER	CB-OG	-5.78	1.34	1.42
1	A	112[B]	SER	CB-OG	-5.78	1.34	1.42
1	A	236	GLU	CD-OE1	-5.27	1.19	1.25

All (31) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	97	ARG	NE-CZ-NH1	-10.42	115.09	120.30
1	A	230	ARG	NE-CZ-NH1	10.25	125.43	120.30
1	A	125	ARG	NE-CZ-NH2	-8.41	116.09	120.30
1	A	270	GLU	OE1-CD-OE2	-7.71	114.04	123.30
1	A	213	ARG	NE-CZ-NH2	-7.50	116.55	120.30
1	A	72	TYR	CB-CG-CD2	7.17	125.30	121.00
1	A	85	GLU	OE1-CD-OE2	-6.89	115.03	123.30
1	A	25	ASP	CB-CG-OD2	-6.88	112.10	118.30
1	A	3	TYR	CG-CD2-CE2	-6.88	115.79	121.30
1	A	85	GLU	CB-CG-CD	6.82	132.62	114.20
1	A	230	ARG	NE-CZ-NH2	-6.63	116.99	120.30
1	A	78	HIS	CG-ND1-CE1	6.56	117.39	108.20
1	A	251	ASP	CB-CG-OD1	6.51	124.16	118.30
1	A	283	ALA	O-C-N	-6.12	112.91	122.70
1	A	114	LEU	O-C-N	-6.00	113.09	122.70
1	A	25	ASP	CB-CG-OD1	6.00	123.70	118.30
1	A	270	GLU	CG-CD-OE2	5.99	130.28	118.30
1	A	82	GLU	CG-CD-OE1	-5.95	106.40	118.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	40	ARG	C-N-CA	5.93	136.52	121.70
1	A	3	TYR	CD1-CE1-CZ	-5.80	114.58	119.80
1	A	197	GLU	OE1-CD-OE2	-5.58	116.60	123.30
1	A	38	GLN	CA-CB-CG	5.43	125.36	113.40
1	A	97	ARG	NE-CZ-NH2	5.43	123.02	120.30
1	A	10	ALA	O-C-N	-5.43	114.02	122.70
1	A	3	TYR	CG-CD1-CE1	5.29	125.53	121.30
1	A	205	ARG	NE-CZ-NH2	-5.23	117.69	120.30
1	A	93	ASP	CB-CG-OD1	5.17	122.95	118.30
1	A	150	GLN	CA-CB-CG	5.17	124.76	113.40
1	A	266	ASP	CB-CG-OD1	5.11	122.89	118.30
1	A	125	ARG	CD-NE-CZ	5.04	130.65	123.60
1	A	173	ARG	NE-CZ-NH1	5.01	122.80	120.30

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	2230	2168	2168	10	0
2	A	3	0	0	0	0
3	A	367	0	0	3	0
All	All	2600	2168	2168	10	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 2.

All (10) 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:277:ALA:O	1:A:281:GLU:HG3	1.88	0.72
1:A:35:ASN:OD1	1:A:38:GLN:HB3	1.97	0.64
1:A:38:GLN:NE2	1:A:41:ALA:HA	2.17	0.59
1:A:282:LYS:HD3	3:A:1241:HOH:O	2.05	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:43:PRO:HB2	3:A:1316:HOH:O	2.12	0.50
1:A:112[B]:SER:OG	1:A:153:ASN:ND2	2.49	0.46
1:A:215[B]:MET:SD	1:A:253:PHE:CD2	3.12	0.43
1:A:150:GLN:NE2	3:A:1295:HOH:O	2.51	0.42
1:A:39:TRP:CZ2	1:A:86:LYS:HG2	2.55	0.42
1:A:68:PRO:HG3	1:A:103:LEU:HD13	2.03	0.41

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	289/285 (101%)	286 (99%)	3 (1%)	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	
1	A	233/227 (103%)	226 (97%)	7 (3%)	46	11

All (7) residues with a non-rotameric sidechain are listed below:



Mol	Chain	Res	Type
1	A	1	MET
1	A	38	GLN
1	A	40	ARG
1	A	47	GLN
1	A	245[A]	ARG
1	A	245[B]	ARG
1	A	282	LYS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	36	GLN
1	A	47	GLN
1	A	96	GLN
1	A	153	ASN
1	A	249	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](#)

Of 3 ligands modelled in this entry, 3 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

There are no such residues in this entry.

## 5.8 Polymer linkage issues

There are no chain breaks in this entry.

## 6 Fit of model and data ⓘ

### 6.1 Protein, DNA and RNA chains ⓘ

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

### 6.3 Carbohydrates ⓘ

EDS was not executed - this section is therefore empty.

### 6.4 Ligands ⓘ

EDS was not executed - this section is therefore empty.

### 6.5 Other polymers ⓘ

EDS was not executed - this section is therefore empty.