wwPDB X-ray Structure Validation Summary Report (i)

Feb 3, 2024 – 08:01 AM EST

PDB ID	:	1LQJ
Title	:	ESCHERICHIA COLI URACIL-DNA GLYCOSYLASE
Authors	:	Saikrishnan, K.; Sagar, M.B.; Ravishankar, R.; Roy, S.; Purnapatre, K.; Varshney, U.; Vijayan, M.
Deposited on	:	2002-05-10
Resolution	:	3.35 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*
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 (1)) were used in the production of this report:

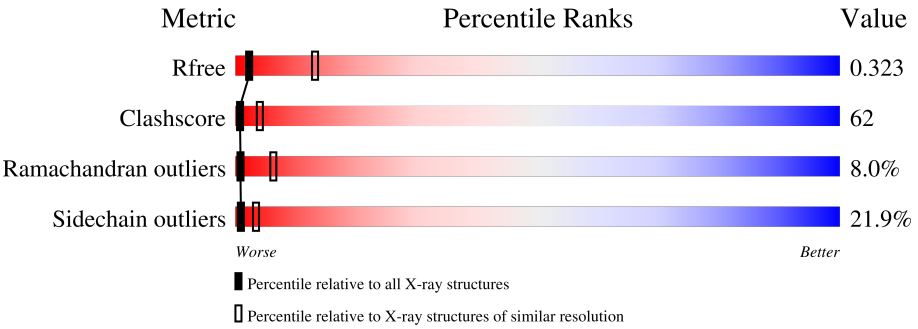
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.36
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 3.35 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	1558 (3.42-3.30)
Clashscore	141614	1627 (3.42-3.30)
Ramachandran outliers	138981	1599 (3.42-3.30)
Sidechain outliers	138945	1598 (3.42-3.30)

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	229	30% 52% 16% ·
1	B	229	23% 59% 16% ··
1	C	229	23% 55% 18% ·
1	D	229	22% 57% 17% · ·

2 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 7329 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 URACIL-DNA GLYCOSYLASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	228	Total	C	N	O	S	0	0	0
			1800	1158	322	317	3			
1	B	226	Total	C	N	O	S	0	0	0
			1789	1152	320	313	4			
1	C	229	Total	C	N	O	S	0	0	0
			1794	1155	320	316	3			
1	D	226	Total	C	N	O	S	0	0	0
			1771	1142	315	311	3			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MET	-	cloning artifact	UNP P12295
B	1	MET	-	cloning artifact	UNP P12295
C	1	MET	-	cloning artifact	UNP P12295
D	1	MET	-	cloning artifact	UNP P12295

- Molecule 2 is water.

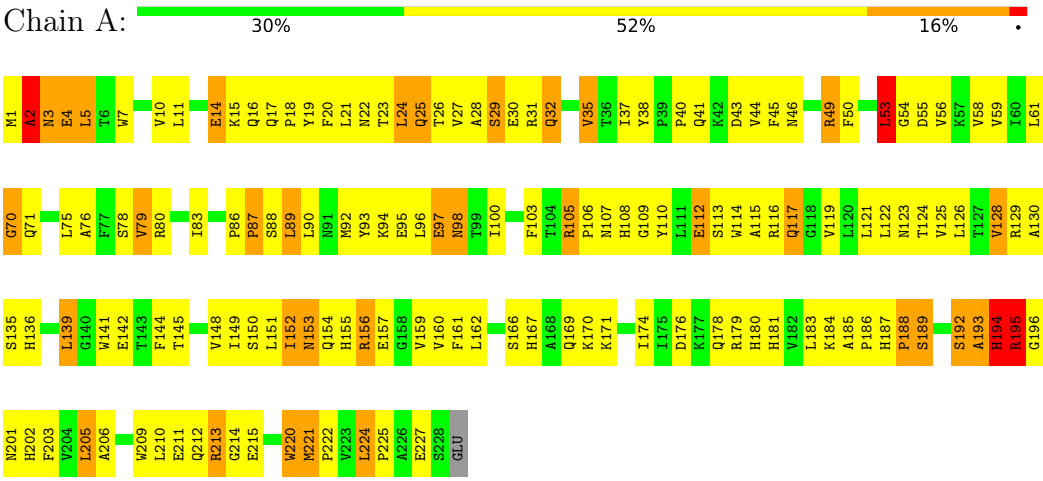
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	40	Total	O	0	0
			40	40		
2	B	27	Total	O	0	0
			27	27		
2	C	29	Total	O	0	0
			29	29		
2	D	79	Total	O	0	0
			79	79		

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.

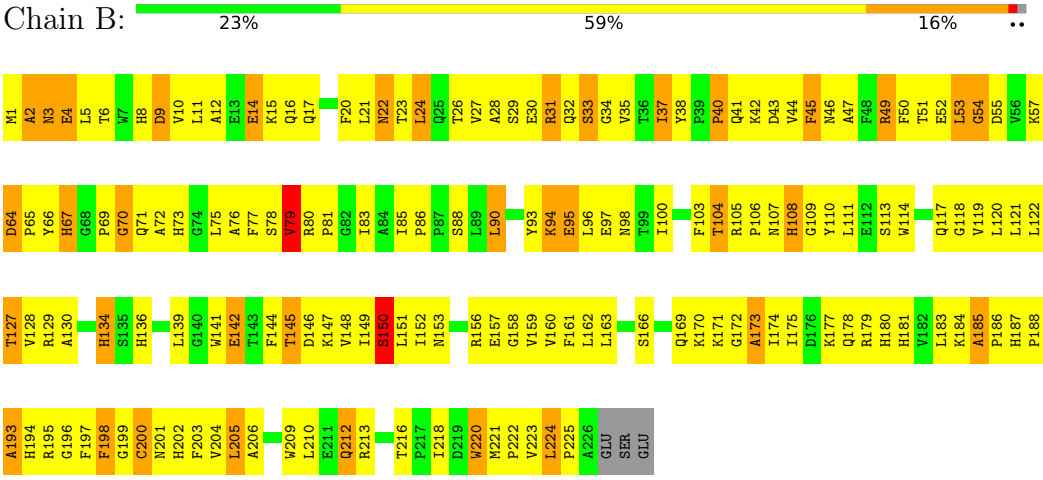
• Molecule 1: URACIL-DNA GLYCOSYLASE

Chain A:



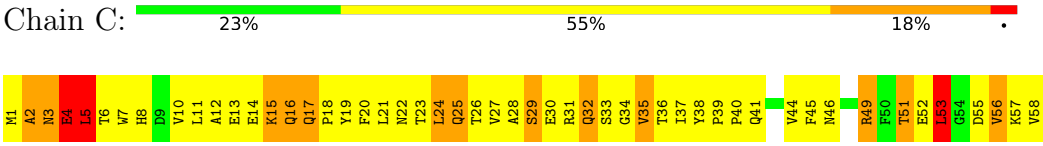
• Molecule 1: URACIL-DNA GLYCOSYLASE

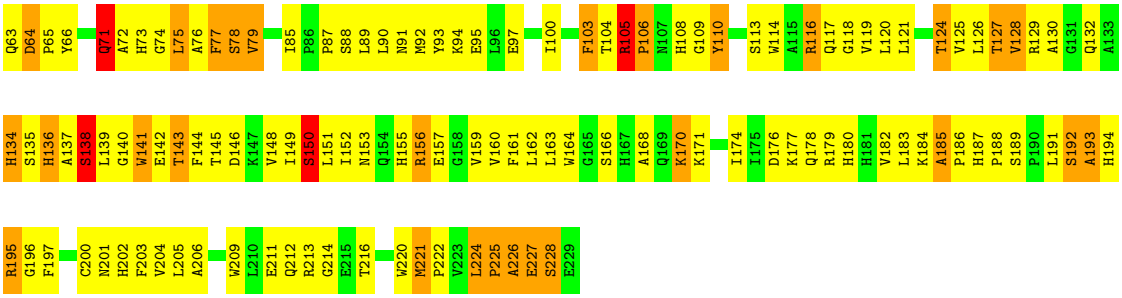
Chain B:



• Molecule 1: URACIL-DNA GLYCOSYLASE

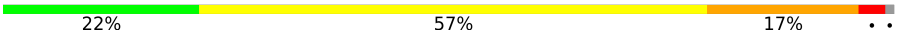
Chain C:

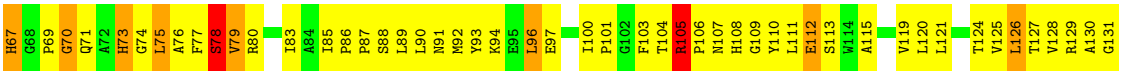


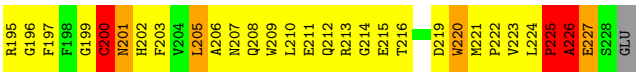


- Molecule 1: URACIL-DNA GLYCOSYLASE

Chain D:







4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 32	Depositor
Cell constants a, b, c, α, β, γ	125.21Å 125.21Å 90.05Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	20.00 – 3.35 19.73 – 3.35	Depositor EDS
% Data completeness (in resolution range)	84.0 (20.00-3.35) 84.0 (19.73-3.35)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.15	Depositor
$< I/\sigma(I) >$ [1]	3.19 (at 3.36Å)	Xtriage
Refinement program	X-PLOR 3.851	Depositor
R, R_{free}	0.241 , 0.326 0.237 , 0.323	Depositor DCC
R_{free} test set	1101 reflections (5.80%)	wwPDB-VP
Wilson B-factor (Å^2)	57.6	Xtriage
Anisotropy	0.057	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.22 , 27.1	EDS
L-test for twinning[2]	$< \|L\| > = 0.39$, $< L^2 > = 0.22$	Xtriage
Estimated twinning fraction	0.326 for -h,-k,l 0.125 for h,-h-k,-l 0.125 for -k,-h,-l	Xtriage
F_o,F_c correlation	0.87	EDS
Total number of atoms	7329	wwPDB-VP
Average B, all atoms (Å^2)	28.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.35% 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	0.70	0/1856	0.89	2/2532 (0.1%)
1	B	0.67	0/1845	0.86	1/2516 (0.0%)
1	C	0.69	0/1849	0.91	5/2522 (0.2%)
1	D	0.66	0/1827	0.87	2/2494 (0.1%)
All	All	0.68	0/7377	0.88	10/10064 (0.1%)

There are no bond length outliers.

The worst 5 of 10 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	2	ALA	N-CA-C	-6.67	92.98	111.00
1	D	226	ALA	N-CA-C	-6.63	93.11	111.00
1	C	225	PRO	N-CA-C	6.46	128.91	112.10
1	C	226	ALA	N-CA-C	6.26	127.90	111.00
1	C	105	ARG	N-CA-C	5.57	126.05	111.00

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	1800	0	1758	195	0
1	B	1789	0	1757	212	0
1	C	1794	0	1747	224	0
1	D	1771	0	1716	246	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	A	40	0	0	1	0
2	B	27	0	0	1	0
2	C	29	0	0	1	0
2	D	79	0	0	10	0
All	All	7329	0	6978	877	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 62.

The worst 5 of 877 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:B:4:GLU:HG3	1:B:54:GLY:HA3	1.16	1.10
1:B:105:ARG:HB3	1:B:107:ASN:HD21	1.12	1.07
1:D:147:LYS:HE3	1:D:151:LEU:HD21	1.35	1.06
1:A:17:GLN:OE1	1:A:18:PRO:HD2	1.54	1.05
1:A:156:ARG:HH11	1:A:156:ARG:HG2	1.19	1.03

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	226/229 (99%)	175 (77%)	35 (16%)	16 (7%)	1 8
1	B	224/229 (98%)	172 (77%)	34 (15%)	18 (8%)	1 6
1	C	227/229 (99%)	174 (77%)	32 (14%)	21 (9%)	0 4
1	D	224/229 (98%)	166 (74%)	41 (18%)	17 (8%)	1 7
All	All	901/916 (98%)	687 (76%)	142 (16%)	72 (8%)	1 6

5 of 72 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	2	ALA
1	A	3	ASN
1	A	193	ALA
1	A	195	ARG
1	B	2	ALA

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	189/194 (97%)	152 (80%)	37 (20%)	1	5
1	B	189/194 (97%)	147 (78%)	42 (22%)	1	3
1	C	186/194 (96%)	146 (78%)	40 (22%)	1	3
1	D	184/194 (95%)	139 (76%)	45 (24%)	0	2
All	All	748/776 (96%)	584 (78%)	164 (22%)	1	3

5 of 164 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	205	LEU
1	D	113	SER
1	D	5	LEU
1	D	49	ARG
1	D	156	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 29 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	25	GLN
1	D	194	HIS
1	C	91	ASN
1	D	91	ASN
1	C	63	GLN

5.3.3 RNA

There are no RNA molecules in this entry.

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

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates

There are no monosaccharides in this entry.

5.6 Ligand geometry

There are no ligands in this entry.

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

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.