Full wwPDB X-ray Structure Validation Report ⓘ

Mar 18, 2025 – 02:10 PM JST

PDB ID	:	8YQ1
Title	:	Linear form of FGF10 from Homo sapiens
Authors	:	Park, H.J.; Park, Y.S.; Lee, C.E.; Kang, L.W.
Deposited on	:	2024-03-18
Resolution	:	2.56 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 ⓘ 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 ⓘ) were used in the production of this report:

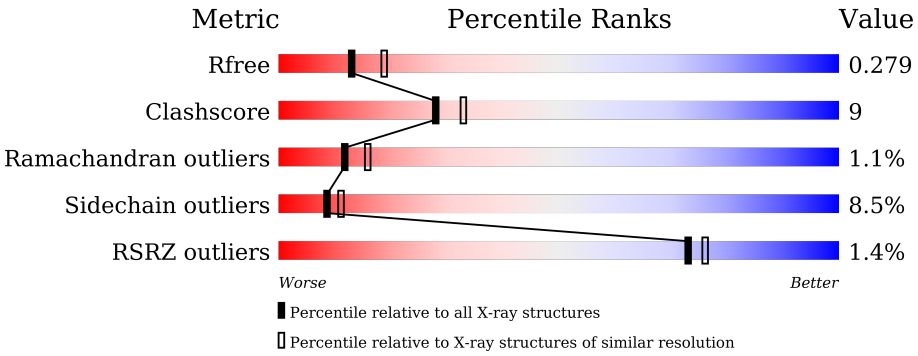
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.21
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.004 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.41.4

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 2.56 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}	164625	1685 (2.58-2.54)
Clashscore	180529	1779 (2.58-2.54)
Ramachandran outliers	177936	1766 (2.58-2.54)
Sidechain outliers	177891	1766 (2.58-2.54)
RSRZ outliers	164620	1685 (2.58-2.54)

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% 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	142	77% 16% 5%
1	B	142	78% 16% 5%

2 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 2281 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 Fibroblast growth factor 10.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	139	Total	C	N	O	S	0	0	0
			1089	692	195	197	5			
1	B	142	Total	C	N	O	S	0	0	0
			1117	709	203	200	5			

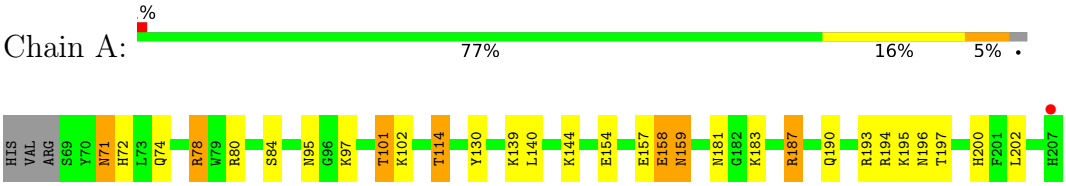
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	33	Total	O	0	0
			33	33		
2	B	42	Total	O	0	0
			42	42		

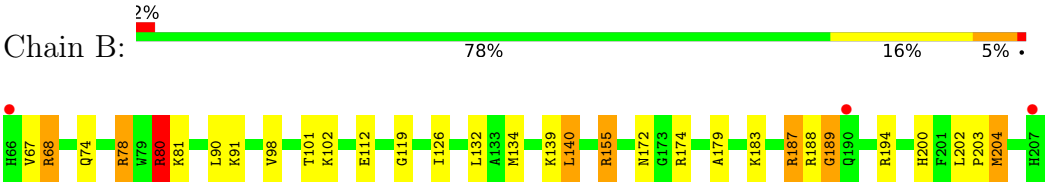
3 Residue-property plots (i)

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 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.

• Molecule 1: Fibroblast growth factor 10



• Molecule 1: Fibroblast growth factor 10



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 65 2 2	Depositor
Cell constants a, b, c, α, β, γ	73.84Å 73.84Å 227.81Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	48.92 – 2.56 48.92 – 2.56	Depositor EDS
% Data completeness (in resolution range)	97.4 (48.92-2.56) 97.4 (48.92-2.56)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	0.07	Depositor
$< I/\sigma(I) >$ [1]	2.44 (at 2.58Å)	Xtriage
Refinement program	REFMAC 5.8.0415	Depositor
R, R_{free}	0.202 , 0.278 0.206 , 0.279	Depositor DCC
R_{free} test set	615 reflections (4.93%)	wwPDB-VP
Wilson B-factor (Å^2)	40.8	Xtriage
Anisotropy	0.090	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.38 , 60.6	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	2281	wwPDB-VP
Average B, all atoms (Å^2)	42.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.96% 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	0.45	0/1114	0.90	3/1504 (0.2%)
1	B	0.39	0/1143	0.81	0/1543
All	All	0.43	0/2257	0.86	3/3047 (0.1%)

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	3
1	B	0	3
All	All	0	6

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	101	THR	CB-CA-C	-5.98	95.44	111.60
1	A	187	ARG	NE-CZ-NH2	-5.63	117.48	120.30
1	A	78	ARG	NE-CZ-NH2	-5.48	117.56	120.30

There are no chirality outliers.

All (6) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	157	GLU	Peptide
1	A	159	ASN	Peptide
1	A	80	ARG	Sidechain
1	B	155	ARG	Sidechain
1	B	78	ARG	Sidechain
1	B	80	ARG	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	1089	0	1037	20	0
1	B	1117	0	1066	18	0
2	A	33	0	0	5	2
2	B	42	0	0	5	3
All	All	2281	0	2103	38	3

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 9.

All (38) 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)
2:A:319:HOH:O	1:B:204:MET:SD	2.22	0.97
1:B:74:GLN:HE22	1:B:119:GLY:H	1.35	0.73
1:A:190:GLN:CB	2:A:328:HOH:O	2.38	0.72
1:B:68:ARG:HD3	2:B:324:HOH:O	1.88	0.71
1:B:174:ARG:CB	2:B:330:HOH:O	2.45	0.65
1:A:158:GLU:OE1	1:A:159:ASN:N	2.31	0.64
1:B:194:ARG:O	1:B:200:HIS:HE1	1.81	0.64
1:A:71:ASN:HD22	1:A:71:ASN:C	2.03	0.62
1:A:158:GLU:CD	1:A:159:ASN:N	2.53	0.62
1:B:68:ARG:NH2	2:B:302:HOH:O	2.35	0.59
1:A:193:ARG:H	1:A:196:ASN:ND2	2.00	0.58
1:B:172:ASN:ND2	2:B:303:HOH:O	2.39	0.55
1:B:132:LEU:HD11	1:B:140:LEU:HD21	1.92	0.52
1:A:114:THR:HG22	2:A:318:HOH:O	2.10	0.52
1:B:188:ARG:CB	2:B:341:HOH:O	2.60	0.49
1:A:187:ARG:NH1	2:A:302:HOH:O	2.47	0.48
1:B:188:ARG:O	1:B:189:GLY:C	2.51	0.48
1:A:158:GLU:OE1	1:A:159:ASN:HB3	2.16	0.46
1:A:194:ARG:O	1:A:200:HIS:HE1	1.99	0.46
1:A:202:LEU:C	1:A:202:LEU:HD13	2.37	0.45
1:A:181:ASN:OD1	1:A:181:ASN:C	2.55	0.45
1:A:78:ARG:NH2	1:A:154:GLU:OE1	2.50	0.44
1:B:134:MET:HA	1:B:139:LYS:O	2.17	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:130:TYR:CZ	1:A:144:LYS:HE2	2.53	0.44
1:B:90:LEU:HD11	1:B:98:VAL:HG13	2.00	0.43
1:A:78:ARG:HH22	1:A:154:GLU:CD	2.22	0.42
1:B:90:LEU:HD12	1:B:91:LYS:N	2.34	0.42
1:A:72:HIS:HB2	1:A:114:THR:HG21	2.02	0.42
1:B:179:ALA:HB3	1:B:187:ARG:HB3	2.02	0.42
1:A:71:ASN:C	1:A:71:ASN:ND2	2.72	0.42
1:A:95:ASN:OD1	1:A:97:LYS:CB	2.68	0.41
1:B:80:ARG:HA	1:B:204:MET:O	2.20	0.41
1:A:114:THR:CG2	2:A:318:HOH:O	2.68	0.41
1:A:139:LYS:HG2	1:A:140:LEU:O	2.21	0.41
1:B:112:GLU:HB2	1:B:126:ILE:HD11	2.02	0.41
1:B:194:ARG:O	1:B:200:HIS:CE1	2.67	0.41
1:A:84:SER:HA	1:A:200:HIS:O	2.21	0.40
1:B:81:LYS:O	1:B:203:PRO:HA	2.21	0.40

All (3) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:342:HOH:O	2:B:342:HOH:O[10_665]	1.18	1.02
2:A:324:HOH:O	2:B:302:HOH:O[8_665]	1.39	0.81
2:A:315:HOH:O	2:B:314:HOH:O[6_664]	1.85	0.35

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	137/142 (96%)	132 (96%)	4 (3%)	1 (1%)	19 25
1	B	140/142 (99%)	132 (94%)	6 (4%)	2 (1%)	9 12
All	All	277/284 (98%)	264 (95%)	10 (4%)	3 (1%)	12 16

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	189	GLY
1	A	158	GLU
1	B	67	VAL

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	110/124 (89%)	102 (93%)	8 (7%)	11 15
1	B	113/124 (91%)	102 (90%)	11 (10%)	6 7
All	All	223/248 (90%)	204 (92%)	19 (8%)	8 11

All (19) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	71	ASN
1	A	74	GLN
1	A	101	THR
1	A	102	LYS
1	A	114	THR
1	A	183	LYS
1	A	195	LYS
1	A	197	THR
1	B	68	ARG
1	B	78	ARG
1	B	80	ARG
1	B	101	THR
1	B	102	LYS
1	B	140	LEU
1	B	155	ARG
1	B	183	LYS
1	B	187	ARG
1	B	202	LEU
1	B	204	MET

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	71	ASN
1	A	74	GLN
1	A	196	ASN
1	A	200	HIS
1	B	74	GLN
1	B	172	ASN
1	B	196	ASN
1	B	200	HIS

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 oligosaccharides 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

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^{th} 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^2)	Q<0.9
1	A	139/142 (97%)	-0.16	1 (0%)	84	86	25, 35, 59, 90	0
1	B	142/142 (100%)	0.09	3 (2%)	63	68	23, 45, 68, 114	0
All	All	281/284 (98%)	-0.03	4 (1%)	73	76	23, 39, 65, 114	0

All (4) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	207	HIS	4.7
1	B	66	HIS	3.5
1	A	207	HIS	2.9
1	B	190	GLN	2.2

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

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

6.3 Carbohydrates

There are no monosaccharides in this entry.

6.4 Ligands

There are no ligands in this entry.

6.5 Other polymers

There are no such residues in this entry.