



wwPDB X-ray Structure Validation Summary Report ⓘ

Jun 11, 2024 – 11:37 PM EDT

PDB ID : 6NFJ
Title : Structure of Beta-Klotho in Complex with FGF19 C-terminal peptide
Authors : Kuzina, E.; Schlessinger, J.; Lee, S.
Deposited on : 2018-12-20
Resolution : 3.19 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 ⓘ 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) : 1.13
EDS : 2.36.2
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) : 2.36.2

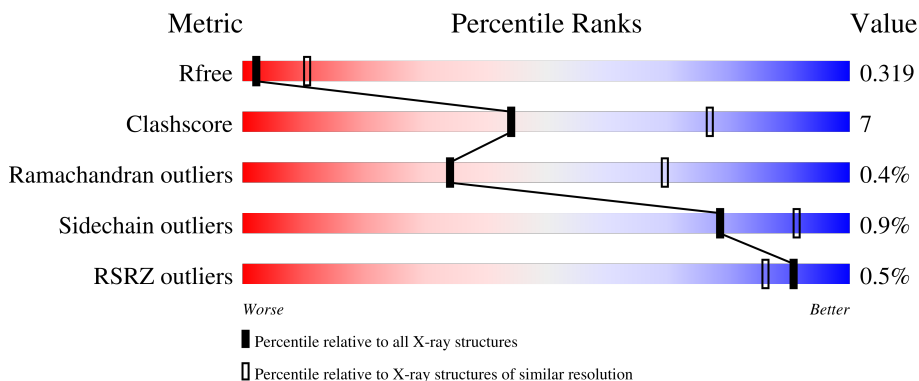
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.19 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.



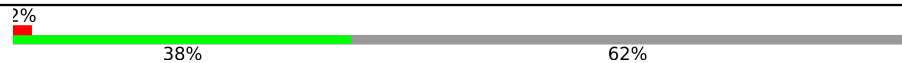
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1133 (3.20-3.20)
Clashscore	141614	1253 (3.20-3.20)
Ramachandran outliers	138981	1234 (3.20-3.20)
Sidechain outliers	138945	1233 (3.20-3.20)
RSRZ outliers	127900	1095 (3.20-3.20)

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 $\leq 5\%$. 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	960	 73% 15% 12%
1	D	960	 76% 12% 12%
2	B	133	 69% 14% 17%
2	E	133	 68% 17% 15%
3	C	50	 38% 62%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
3	F	50	 <p>A horizontal bar chart representing the quality of chain. The bar is divided into three segments: a small red segment at the beginning labeled '2%', a green segment in the middle labeled '38%', and a grey segment at the end labeled '62%'.</p>

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 14271 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 Beta-klotho.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	844	6373	4149	1076	1126	22	0	0	0
1	D	846	6129	3969	1051	1088	21	0	0	0

There are 14 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	308	GLN	ASN	engineered mutation	UNP Q86Z14
A	611	GLN	ASN	engineered mutation	UNP Q86Z14
A	985	ASN	-	expression tag	UNP Q86Z14
A	986	LEU	-	expression tag	UNP Q86Z14
A	987	TYR	-	expression tag	UNP Q86Z14
A	988	PHE	-	expression tag	UNP Q86Z14
A	989	GLN	-	expression tag	UNP Q86Z14
D	308	GLN	ASN	engineered mutation	UNP Q86Z14
D	611	GLN	ASN	engineered mutation	UNP Q86Z14
D	985	ASN	-	expression tag	UNP Q86Z14
D	986	LEU	-	expression tag	UNP Q86Z14
D	987	TYR	-	expression tag	UNP Q86Z14
D	988	PHE	-	expression tag	UNP Q86Z14
D	989	GLN	-	expression tag	UNP Q86Z14

- Molecule 2 is a protein called Nanobody 30.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	111	762	490	136	132	4	0	0	0
2	E	113	763	488	135	136	4	0	0	0

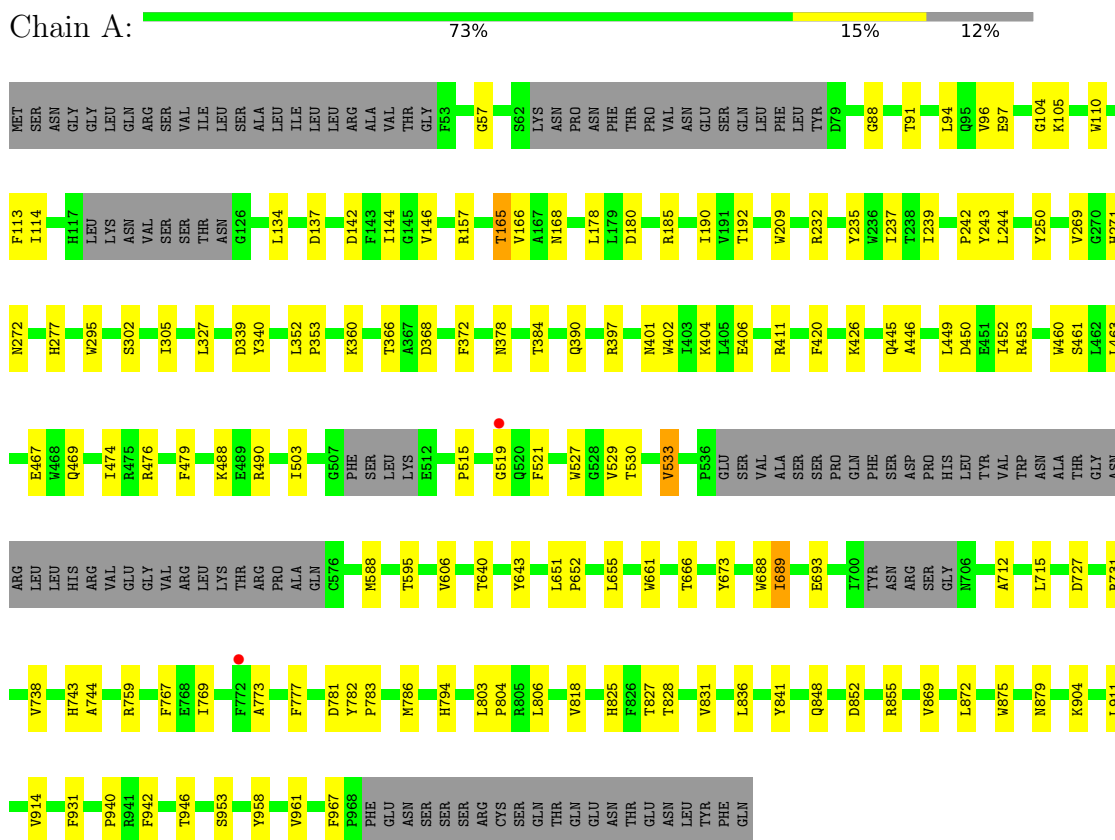
- Molecule 3 is a protein called Fibroblast growth factor 19.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	C	19	122	77	19	25	1	0	0	0
3	F	19	122	77	19	25	1	0	0	0

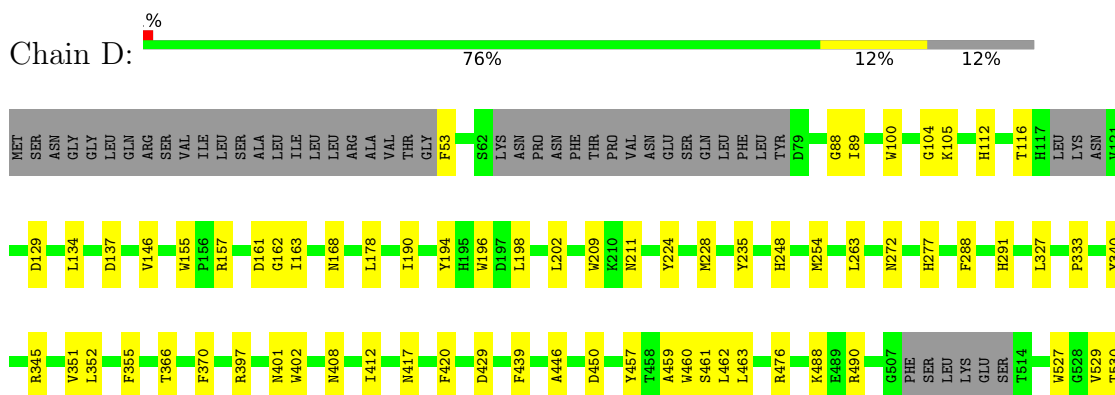
3 Residue-property plots [i](#)

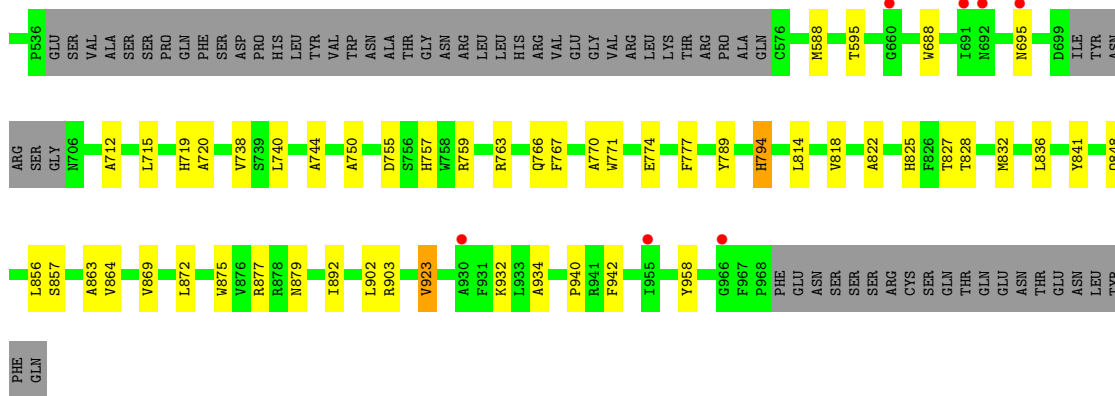
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: Beta-klotho

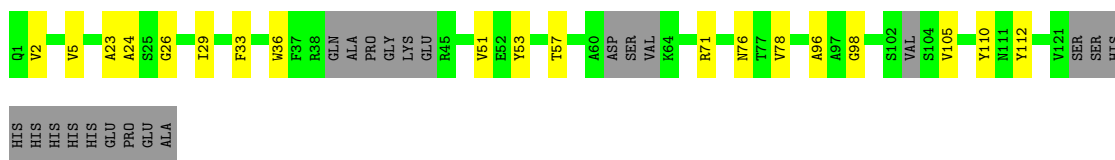


- Molecule 1: Beta-klotho





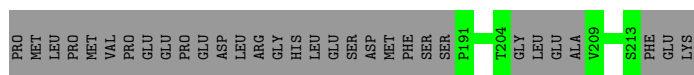
• Molecule 2: Nanobody 30



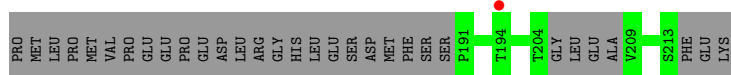
• Molecule 2: Nanobody 30



• Molecule 3: Fibroblast growth factor 19



• Molecule 3: Fibroblast growth factor 19



4 Data and refinement statistics i

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	130.09Å 143.90Å 141.05Å 90.00° 90.90° 90.00°	Depositor
Resolution (Å)	59.42 – 3.19 59.42 – 3.19	Depositor EDS
% Data completeness (in resolution range)	97.8 (59.42-3.19) 97.7 (59.42-3.19)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.11 (at 3.19Å)	Xtrriage
Refinement program	PHENIX (1.13_2998: ???)	Depositor
R, R_{free}	0.280 , 0.320 0.279 , 0.319	Depositor DCC
R_{free} test set	1957 reflections (4.64%)	wwPDB-VP
Wilson B-factor (Å ²)	77.8	Xtrriage
Anisotropy	0.438	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 72.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.38$, $\langle L^2 \rangle = 0.21$	Xtrriage
Estimated twinning fraction	0.064 for -h,-k,l	Xtrriage
F_o, F_c correlation	0.90	EDS
Total number of atoms	14271	wwPDB-VP
Average B, all atoms (Å ²)	80.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 55.18 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 3.2847e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

¹Intensities estimated from amplitudes.

²Theoretical 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

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	0.24	0/6569	0.40	0/8979
1	D	0.24	0/6319	0.41	0/8666
2	B	0.25	0/778	0.42	0/1059
2	E	0.26	0/780	0.43	0/1064
3	C	0.26	0/124	0.45	0/168
3	F	0.31	0/124	0.50	0/168
All	All	0.24	0/14694	0.41	0/20104

There are no bond length outliers.

There are no bond angle outliers.

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	6373	0	5751	82	0
1	D	6129	0	5196	73	0
2	B	762	0	624	12	0
2	E	763	0	597	13	0
3	C	122	0	99	0	0
3	F	122	0	99	0	0
All	All	14271	0	12366	175	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 7.

The worst 5 of 175 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:B:2:VAL:HA	2:B:26:GLY:HA3	1.56	0.86
1:D:755:ASP:OD2	2:E:56:ASN:N	2.15	0.80
1:D:759:ARG:NH2	2:E:100:GLY:O	2.19	0.76
1:A:96:VAL:HG13	1:A:463:LEU:HD11	1.70	0.74
2:E:10:GLY:HA3	2:E:119:VAL:HA	1.73	0.69

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	832/960 (87%)	771 (93%)	59 (7%)	2 (0%)	47	79
1	D	834/960 (87%)	729 (87%)	103 (12%)	2 (0%)	47	79
2	B	103/133 (77%)	85 (82%)	17 (16%)	1 (1%)	15	54
2	E	107/133 (80%)	87 (81%)	18 (17%)	2 (2%)	8	39
3	C	15/50 (30%)	15 (100%)	0	0	100	100
3	F	15/50 (30%)	14 (93%)	1 (7%)	0	100	100
All	All	1906/2286 (83%)	1701 (89%)	198 (10%)	7 (0%)	34	69

5 of 7 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	426	LYS
2	E	103	VAL
2	B	105	VAL
1	D	932	LYS
2	E	27	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	583/827 (70%)	577 (99%)	6 (1%)	76	90
1	D	505/827 (61%)	500 (99%)	5 (1%)	76	90
2	B	52/106 (49%)	52 (100%)	0	100	100
2	E	49/106 (46%)	49 (100%)	0	100	100
3	C	12/46 (26%)	12 (100%)	0	100	100
3	F	12/46 (26%)	12 (100%)	0	100	100
All	All	1213/1958 (62%)	1202 (99%)	11 (1%)	78	91

5 of 11 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	355	PHE
1	D	794	HIS
1	D	958	TYR
1	D	923	VAL
1	A	946	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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, 95th 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	844/960 (87%)	-0.17	2 (0%) 95 94	37, 75, 105, 139	0
1	D	846/960 (88%)	-0.16	7 (0%) 86 78	28, 83, 147, 182	0
2	B	111/133 (83%)	-0.10	0 100 100	56, 89, 119, 147	0
2	E	113/133 (84%)	-0.14	0 100 100	62, 92, 113, 134	0
3	C	19/50 (38%)	-0.28	0 100 100	66, 77, 110, 114	0
3	F	19/50 (38%)	-0.02	1 (5%) 26 14	78, 100, 124, 129	0
All	All	1952/2286 (85%)	-0.16	10 (0%) 91 86	28, 80, 133, 182	0

The worst 5 of 10 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	966	GLY	5.0
1	D	660	GLY	3.1
1	D	955	ILE	2.9
1	D	930	ALA	2.9
1	D	691	ILE	2.9

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

There are no such residues in this entry.