



wwPDB X-ray Structure Validation Summary Report ⓘ

Oct 23, 2021 – 01:15 PM EDT

PDB ID : 1EV2
Title : CRYSTAL STRUCTURE OF FGF2 IN COMPLEX WITH THE EX-
TRACELLULAR LIGAND BINDING DOMAIN OF FGF RECEPTOR 2
(FGFR2)
Authors : Plotnikov, A.N.; Hubbard, S.R.; Schlessinger, J.; Mohammadi, M.
Deposited on : 2000-04-19
Resolution : 2.20 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 following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtrriage (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) : 2.23.2

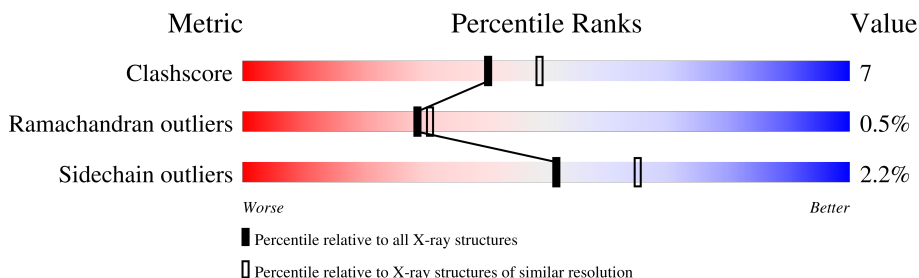
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.20 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	5594 (2.20-2.20)
Ramachandran outliers	138981	5503 (2.20-2.20)
Sidechain outliers	138945	5504 (2.20-2.20)

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 $\leq 5\%$

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	132	84% 14% ..
1	B	132	86% 12% ..
1	C	132	82% 16% ..
1	D	132	85% 13% ..
2	E	220	77% 11% 12%
2	F	220	74% 14% • 11%
2	G	220	79% 11% 9%
2	H	220	78% 12% • 9%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 10101 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 PROTEIN (FIBROBLAST GROWTH FACTOR 2).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	130	971	616	171	180	4	0	0	0
1	B	130	972	613	174	181	4	0	0	0
1	C	130	997	637	175	181	4	0	0	0
1	D	130	998	637	178	179	4	0	0	0

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	69	SER	CYS	engineered mutation	UNP P09038
A	87	SER	CYS	engineered mutation	UNP P09038
B	69	SER	CYS	engineered mutation	UNP P09038
B	87	SER	CYS	engineered mutation	UNP P09038
C	69	SER	CYS	engineered mutation	UNP P09038
C	87	SER	CYS	engineered mutation	UNP P09038
D	69	SER	CYS	engineered mutation	UNP P09038
D	87	SER	CYS	engineered mutation	UNP P09038

- Molecule 2 is a protein called PROTEIN (FIBROBLAST GROWTH FACTOR RECEPTOR 2).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	E	194	1442	917	256	261	8	0	0	0
2	F	195	1435	908	258	261	8	0	0	0
2	G	200	1508	963	263	274	8	0	0	0
2	H	201	1495	952	262	273	8	0	0	0

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total	O	S	0	0
			5	4	1		
3	D	1	Total	O	S	0	0
			5	4	1		

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	16	Total	O	0	0
			16	16		
4	B	13	Total	O	0	0
			13	13		
4	C	22	Total	O	0	0
			22	22		
4	D	22	Total	O	0	0
			22	22		
4	E	49	Total	O	0	0
			49	49		
4	F	52	Total	O	0	0
			52	52		
4	G	46	Total	O	0	0
			46	46		

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	H	43	Total	O	0	0
			43	43		

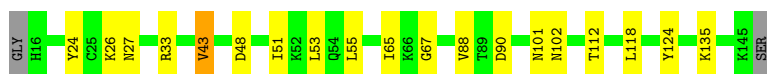
3 Residue-property plots [i](#)

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: PROTEIN (FIBROBLAST GROWTH FACTOR 2)

Chain A:  84% 14% ..




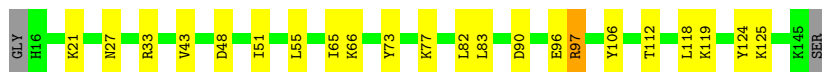
- Molecule 1: PROTEIN (FIBROBLAST GROWTH FACTOR 2)

Chain B:  86% 12% ..




- Molecule 1: PROTEIN (FIBROBLAST GROWTH FACTOR 2)

Chain C:  82% 16% ..




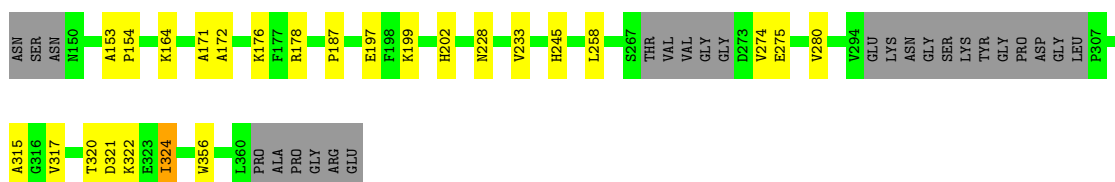
- Molecule 1: PROTEIN (FIBROBLAST GROWTH FACTOR 2)

Chain D:  85% 13% ..



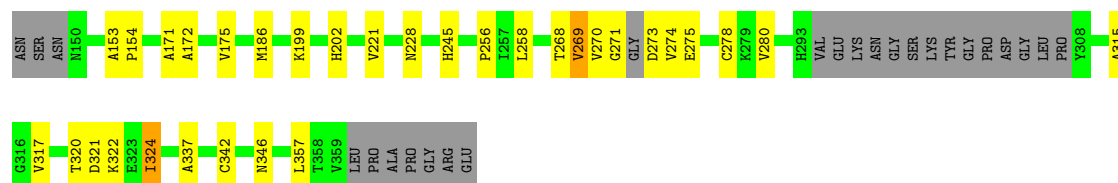
- Molecule 2: PROTEIN (FIBROBLAST GROWTH FACTOR RECEPTOR 2)

Chain E:  77% 11% 12%




- Molecule 2: PROTEIN (FIBROBLAST GROWTH FACTOR RECEPTOR 2)

Chain F:  74% 14% 11%




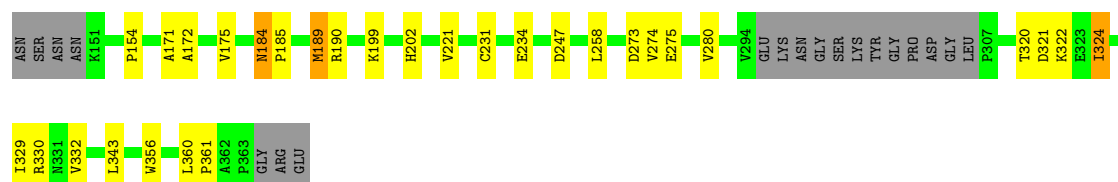
- Molecule 2: PROTEIN (FIBROBLAST GROWTH FACTOR RECEPTOR 2)

Chain G:  79% 11% 9%



- Molecule 2: PROTEIN (FIBROBLAST GROWTH FACTOR RECEPTOR 2)

Chain H:  78% 12% 9%



4 Data and refinement statistics

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

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	72.20Å 71.68Å 90.92Å 90.53° 89.98° 89.99°	Depositor
Resolution (Å)	25.00 – 2.20	Depositor
% Data completeness (in resolution range)	91.7 (25.00-2.20)	Depositor
R_{merge}	0.04	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	CNS	Depositor
R, R_{free}	0.248 , 0.273	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	10101	wwPDB-VP
Average B, all atoms (Å ²)	38.0	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: SO4

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	0.40	0/991	0.64	0/1340
1	B	0.40	0/990	0.66	0/1336
1	C	0.40	0/1018	0.66	0/1372
1	D	0.39	0/1019	0.66	0/1374
2	E	0.37	0/1478	0.61	0/2017
2	F	0.37	0/1468	0.62	0/2001
2	G	0.38	0/1549	0.62	1/2120 (0.0%)
2	H	0.37	0/1535	0.61	0/2102
All	All	0.38	0/10048	0.63	1/13662 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	G	362	ALA	N-CA-C	5.14	124.87	111.00

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	A	971	0	906	12	0
1	B	972	0	917	11	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	C	997	0	962	18	0
1	D	998	0	961	11	0
2	E	1442	0	1338	19	0
2	F	1435	0	1329	23	0
2	G	1508	0	1428	16	0
2	H	1495	0	1400	24	0
3	A	5	0	0	0	0
3	B	5	0	0	0	0
3	C	5	0	0	0	0
3	D	5	0	0	0	0
4	A	16	0	0	0	0
4	B	13	0	0	0	0
4	C	22	0	0	0	0
4	D	22	0	0	0	0
4	E	49	0	0	0	0
4	F	52	0	0	0	0
4	G	46	0	0	2	0
4	H	43	0	0	0	0
All	All	10101	0	9241	130	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 130 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:F:268:THR:HG22	2:F:269:VAL:H	1.21	1.01
2:E:320:THR:HG22	2:E:322:LYS:H	1.29	0.96
2:E:199:LYS:H	2:E:202:HIS:CD2	1.91	0.89
2:F:320:THR:HG22	2:F:322:LYS:H	1.38	0.88
2:F:199:LYS:H	2:F:202:HIS:CD2	1.92	0.88

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	128/132 (97%)	125 (98%)	2 (2%)	1 (1%)	19	19
1	B	128/132 (97%)	124 (97%)	3 (2%)	1 (1%)	19	19
1	C	128/132 (97%)	125 (98%)	2 (2%)	1 (1%)	19	19
1	D	128/132 (97%)	125 (98%)	2 (2%)	1 (1%)	19	19
2	E	188/220 (86%)	183 (97%)	5 (3%)	0	100	100
2	F	189/220 (86%)	182 (96%)	5 (3%)	2 (1%)	14	12
2	G	196/220 (89%)	191 (97%)	4 (2%)	1 (0%)	29	31
2	H	197/220 (90%)	192 (98%)	5 (2%)	0	100	100
All	All	1282/1408 (91%)	1247 (97%)	28 (2%)	7 (0%)	29	31

5 of 7 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	112	THR
1	B	112	THR
1	C	112	THR
1	D	112	THR
2	F	270	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	94/113 (83%)	91 (97%)	3 (3%)	39	50
1	B	95/113 (84%)	92 (97%)	3 (3%)	39	50
1	C	99/113 (88%)	97 (98%)	2 (2%)	55	69
1	D	98/113 (87%)	96 (98%)	2 (2%)	55	69
2	E	140/187 (75%)	138 (99%)	2 (1%)	67	80
2	F	138/187 (74%)	136 (99%)	2 (1%)	67	80

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	G	154/187 (82%)	152 (99%)	2 (1%)	69	81
2	H	149/187 (80%)	144 (97%)	5 (3%)	37	47
All	All	967/1200 (81%)	946 (98%)	21 (2%)	52	65

5 of 21 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	G	247	ASP
2	H	189	MET
2	H	356	TRP
2	H	247	ASP
2	H	184	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 16 such sidechains are listed below:

Mol	Chain	Res	Type
2	H	241	ASN
2	H	202	HIS
2	F	202	HIS
2	H	184	ASN
2	F	167	HIS

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](#)

4 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
3	SO4	D	9003	-	4,4,4	0.29	0	6,6,6	0.11	0
3	SO4	C	9002	-	4,4,4	0.26	0	6,6,6	0.16	0
3	SO4	B	9001	-	4,4,4	0.22	0	6,6,6	0.09	0
3	SO4	A	9004	-	4,4,4	0.24	0	6,6,6	0.11	0

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.