



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 10:29 AM UTC

PDB ID : 4RWI / pdb_00004rwi
Title : Crystal structure of V561M FGFR1 gatekeeper mutation (C488A, C584S, V561M), apo
Authors : Sohl, C.D.; Anderson, K.S.
Deposited on : 2014-12-04
Resolution : 2.29 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	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

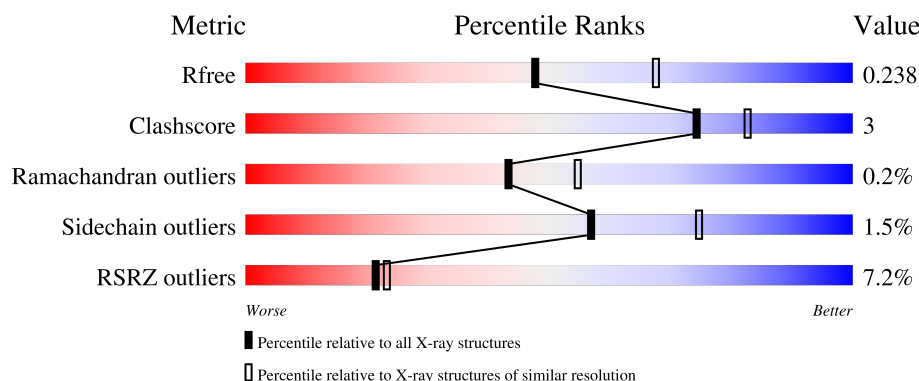
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.29 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}	180053	6319 (2.30-2.30)
Clashscore	190562	6919 (2.30-2.30)
Ramachandran outliers	187476	6854 (2.30-2.30)
Sidechain outliers	187428	6854 (2.30-2.30)
RSRZ outliers	180081	6325 (2.30-2.30)

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 $\leq 5\%$. 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	317	6% 88% 8% • •
1	B	317	7% 80% 8% • 12%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 4613 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 receptor 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	305	Total	C	N	O	S	0	1	0
			2378	1508	410	441	19			
1	B	280	Total	C	N	O	S	0	0	0
			2153	1364	366	405	18			

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	449	MET	-	expression tag	UNP P11362
A	450	GLY	-	expression tag	UNP P11362
A	451	HIS	-	expression tag	UNP P11362
A	452	HIS	-	expression tag	UNP P11362
A	453	HIS	-	expression tag	UNP P11362
A	454	HIS	-	expression tag	UNP P11362
A	455	HIS	-	expression tag	UNP P11362
A	456	HIS	-	expression tag	UNP P11362
A	457	MET	-	expression tag	UNP P11362
A	488	ALA	CYS	engineered mutation	UNP P11362
A	561	MET	VAL	engineered mutation	UNP P11362
A	584	SER	CYS	engineered mutation	UNP P11362
B	449	MET	-	expression tag	UNP P11362
B	450	GLY	-	expression tag	UNP P11362
B	451	HIS	-	expression tag	UNP P11362
B	452	HIS	-	expression tag	UNP P11362
B	453	HIS	-	expression tag	UNP P11362
B	454	HIS	-	expression tag	UNP P11362
B	455	HIS	-	expression tag	UNP P11362
B	456	HIS	-	expression tag	UNP P11362
B	457	MET	-	expression tag	UNP P11362
B	488	ALA	CYS	engineered mutation	UNP P11362
B	561	MET	VAL	engineered mutation	UNP P11362
B	584	SER	CYS	engineered mutation	UNP P11362

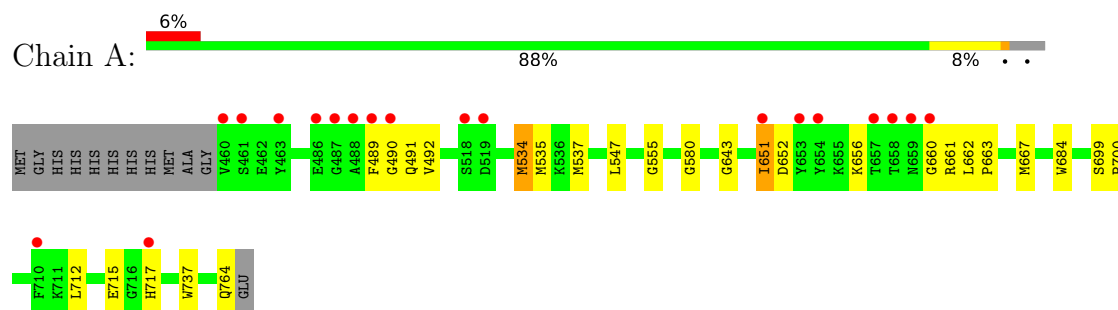
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	53	Total 53	O 53	0	0
2	B	29	Total 29	O 29	0	0

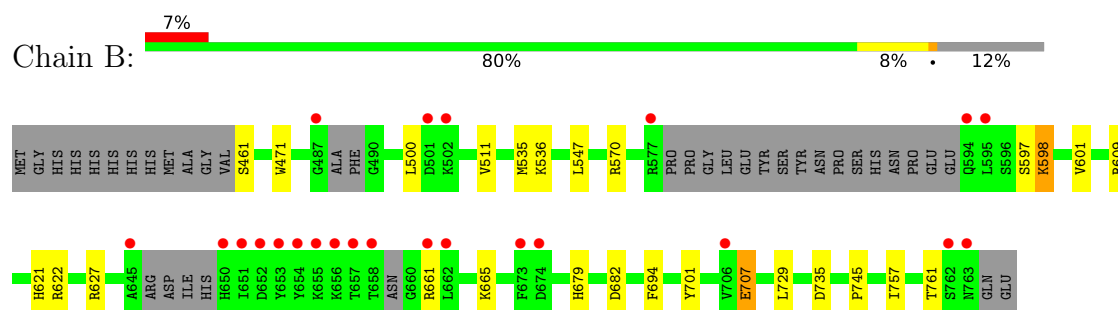
3 Residue-property plots [i](#)

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: Fibroblast growth factor receptor 1



- Molecule 1: Fibroblast growth factor receptor 1



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	211.06Å 50.55Å 66.53Å 90.00° 107.69° 90.00°	Depositor
Resolution (Å)	47.50 – 2.29 47.50 – 2.29	Depositor EDS
% Data completeness (in resolution range)	99.8 (47.50-2.29) 97.8 (47.50-2.29)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.05	Depositor
$\langle I/\sigma(I) \rangle$ ¹	7.47 (at 2.29Å)	Xtriage
Refinement program	PHENIX	Depositor
R, R_{free}	0.185 , 0.236 0.199 , 0.238	Depositor DCC
R_{free} test set	1526 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å ²)	28.2	Xtriage
Anisotropy	0.736	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 32.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.017 for -h-2*k,l	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	4613	wwPDB-VP
Average B, all atoms (Å ²)	34.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.95% of the height of the origin peak. No significant pseudotranslation is detected.*

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 [i](#)

5.1 Standard geometry [i](#)

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	0.59	0/2435	0.83	2/3307 (0.1%)
1	B	0.55	0/2192	0.85	0/2969
All	All	0.57	0/4627	0.84	2/6276 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	555	GLY	CA-C-N	5.15	125.08	119.78
1	A	555	GLY	C-N-CA	5.15	125.08	119.78

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	2378	0	2312	14	0
1	B	2153	0	2090	15	0
2	A	53	0	0	0	0
2	B	29	0	0	1	0
All	All	4613	0	4402	28	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 3.

All (28) 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:570:ARG:NH1	2:B:820:HOH:O	2.19	0.74
1:A:656:LYS:HB3	1:A:660:GLY:HA2	1.74	0.67
1:A:656:LYS:HE3	1:A:662:LEU:HD11	1.85	0.58
1:A:535:MET:HE2	1:A:547:LEU:HB2	1.89	0.55
1:B:627:ARG:HH11	1:B:661:ARG:NH1	2.06	0.52
1:B:707:GLU:H	1:B:707:GLU:CD	2.18	0.50
1:A:661:ARG:O	1:A:663:PRO:HD3	2.12	0.49
1:A:764:GLN:HA	1:B:679:HIS:HD2	1.77	0.49
1:B:665:LYS:NZ	1:B:701:TYR:O	2.45	0.49
1:A:651:ILE:HG12	1:A:652:ASP:N	2.27	0.49
1:A:489:PHE:HA	1:A:490:GLY:HA2	1.57	0.48
1:B:597:SER:O	1:B:601:VAL:HG23	2.16	0.46
1:A:684:TRP:CE3	1:A:737:TRP:HA	2.51	0.46
1:B:598:LYS:HE3	1:B:761:THR:O	2.17	0.45
1:B:471:TRP:CD1	1:B:536:LYS:HE2	2.52	0.45
1:A:651:ILE:CD1	1:A:667:MET:HE1	2.48	0.44
1:B:535:MET:HE2	1:B:547:LEU:HB2	2.00	0.44
1:A:491:GLN:HG2	1:A:492:VAL:N	2.34	0.43
1:A:534:MET:HE3	1:A:643:GLY:HA2	2.01	0.42
1:A:537:MET:HE3	1:A:537:MET:HB2	1.82	0.42
1:A:699:SER:HA	1:A:700:PRO:HD3	1.91	0.42
1:B:694:PHE:CZ	1:B:729:LEU:HD13	2.54	0.42
1:B:621:HIS:O	1:B:622:ARG:HB2	2.20	0.42
1:B:679:HIS:O	1:B:682:ASP:HB2	2.20	0.42
1:A:712:LEU:O	1:A:717:HIS:HB3	2.20	0.41
1:B:735:ASP:HB3	1:B:745:PRO:HD3	2.02	0.41
1:B:500:LEU:HD11	1:B:511:VAL:HG11	2.02	0.41
1:B:601:VAL:HG11	1:B:757:ILE:HG22	2.02	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	304/317 (96%)	294 (97%)	9 (3%)	1 (0%)	36	46
1	B	270/317 (85%)	267 (99%)	3 (1%)	0	100	100
All	All	574/634 (90%)	561 (98%)	12 (2%)	1 (0%)	43	55

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	580	GLY

5.3.2 Protein sidechains ⓘ

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	252/277 (91%)	249 (99%)	3 (1%)	63	79
1	B	226/277 (82%)	222 (98%)	4 (2%)	51	70
All	All	478/554 (86%)	471 (98%)	7 (2%)	57	75

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

Mol	Chain	Res	Type
1	A	534	MET
1	A	651	ILE
1	A	715	GLU
1	B	461	SER
1	B	598	LYS
1	B	609	ARG
1	B	707	GLU

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

Mol	Chain	Res	Type
1	A	553	GLN
1	A	594	GLN
1	A	659	ASN

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Mol	Chain	Res	Type
1	A	743	GLN
1	B	679	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 oligosaccharides 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

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, 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	305/317 (96%)	0.13	19 (6%) 26 28	16, 29, 59, 79	1 (0%)
1	B	280/317 (88%)	0.33	23 (8%) 17 19	23, 34, 60, 90	0
All	All	585/634 (92%)	0.23	42 (7%) 21 23	16, 32, 60, 90	1 (0%)

All (42) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	488	ALA	5.7
1	A	658	THR	5.6
1	B	651	ILE	5.2
1	B	657	THR	5.0
1	B	658	THR	4.9
1	B	653	TYR	4.9
1	B	650	HIS	4.7
1	A	489	PHE	4.4
1	B	577	ARG	3.6
1	A	460	VAL	3.5
1	B	652	ASP	3.3
1	B	645	ALA	3.1
1	A	653	TYR	3.1
1	A	660	GLY	3.0
1	A	651	ILE	3.0
1	A	463	TYR	2.9
1	A	486	GLU	2.9
1	A	657	THR	2.9
1	B	762	SER	2.8
1	B	487	GLY	2.8
1	A	659	ASN	2.7
1	A	717	HIS	2.7
1	B	594	GLN	2.7
1	B	673	PHE	2.7

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Mol	Chain	Res	Type	RSRZ
1	A	461	SER	2.7
1	B	662	LEU	2.7
1	B	654	TYR	2.6
1	B	655	LYS	2.6
1	A	710	PHE	2.5
1	B	763	ASN	2.4
1	B	661	ARG	2.4
1	A	487	GLY	2.4
1	B	706	VAL	2.3
1	B	502	LYS	2.2
1	A	490	GLY	2.2
1	B	656	LYS	2.2
1	B	674	ASP	2.2
1	A	519	ASP	2.1
1	B	501	ASP	2.1
1	A	654	TYR	2.1
1	B	595	LEU	2.0
1	A	518	SER	2.0

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 oligosaccharides in this entry.

6.4 Ligands [i](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.