



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 05:40 AM UTC

PDB ID : 1VR2 / pdb\_00001vr2  
Title : HUMAN VASCULAR ENDOTHELIAL GROWTH FACTOR RECEPTOR 2 (KDR) KINASE DOMAIN  
Authors : Mctigue, M.; Wickersham, J.; Pinko, C.; Showalter, R.; Parast, C.; Tempczyk-Russell, A.; Gehring, M.; Mroczkowski, B.; Kan, C.; Villafranca, J.; Appelt, K.  
Deposited on : 1998-12-03  
Resolution : 2.40 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](mailto: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>.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4-5-2 with Phenix2.0  
Xtrriage (Phenix) : **NOT EXECUTED**  
EDS : **NOT EXECUTED**  
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.49

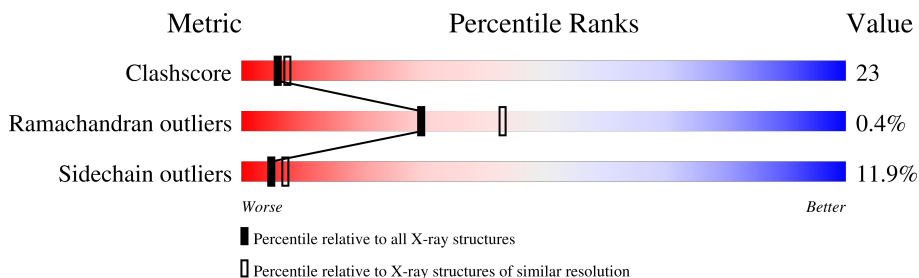
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.40 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	190562	5391 (2.40-2.40)
Ramachandran outliers	187476	5320 (2.40-2.40)
Sidechain outliers	187428	5321 (2.40-2.40)

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  $\geq 3$ , 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	316	

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 2291 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 (VASCULAR ENDOTHELIAL GROWTH FACTOR RECEPTOR KINASE).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	275	2150	1380	370	384	16	0	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	990	VAL	GLU	engineered mutation	UNP P35968
A	1059	PTR	TYR	modified residue	UNP P35968

- Molecule 2 is water.

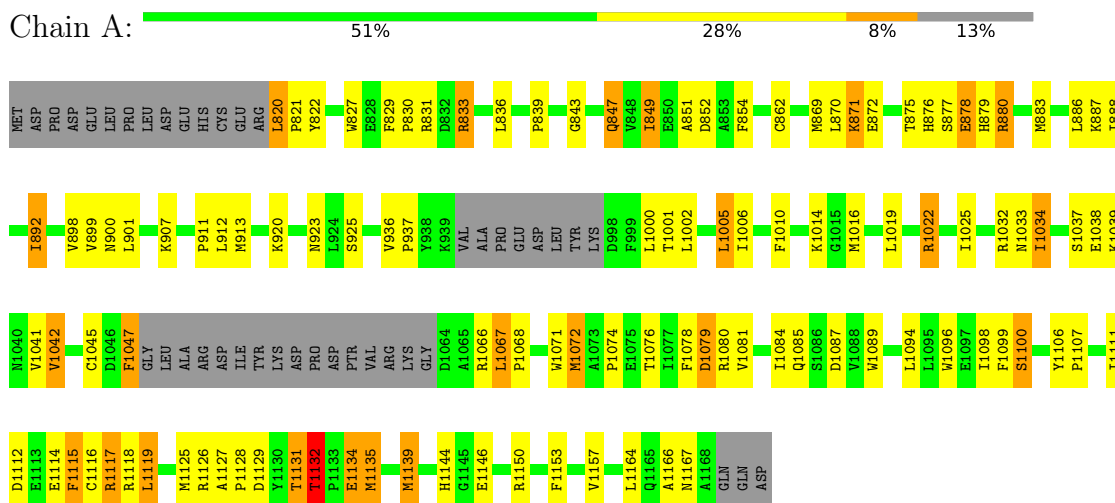
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	141	Total	O	0	0
			141	141		

### 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 (VASCULAR ENDOTHELIAL GROWTH FACTOR RECEPTOR KINASE)



## 4 Data and refinement statistics

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

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	95.41Å 96.04Å 38.22Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	8.00 – 2.40	Depositor
% Data completeness (in resolution range)	89.5 (8.00-2.40)	Depositor
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.05	Depositor
Refinement program	X-PLOR 3.1	Depositor
R, $R_{free}$	0.215 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	2291	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	32.0	wwPDB-VP

## 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	0.81	1/2201 (0.0%)	1.19	18/2982 (0.6%)

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	1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	1139	MET	SD-CE	-6.65	1.62	1.79

All (18) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1132	THR	N-CA-C	-9.13	97.34	110.40
1	A	920	LYS	N-CA-C	8.34	121.30	111.71
1	A	1100	SER	N-CA-C	-8.26	102.51	112.59
1	A	1089	TRP	N-CA-C	-8.08	102.17	110.97
1	A	827	TRP	N-CA-C	7.89	123.04	113.41
1	A	1000	LEU	N-CA-C	-7.59	100.74	110.53
1	A	1115	PHE	N-CA-C	-7.34	103.21	111.14
1	A	878	GLU	N-CA-C	-7.23	103.44	111.82
1	A	1041	VAL	N-CA-C	-6.31	99.28	108.87
1	A	1129	ASP	N-CA-C	5.72	119.73	112.87
1	A	1034	ILE	N-CA-C	-5.69	100.15	108.11
1	A	1166	ALA	N-CA-C	-5.49	105.45	111.82
1	A	1072	MET	N-CA-C	5.23	118.08	109.76
1	A	1135	MET	N-CA-C	-5.11	105.79	111.36
1	A	900	ASN	N-CA-C	5.05	117.95	110.48

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1038	GLU	N-CA-C	5.04	121.54	110.80
1	A	901	LEU	N-CA-C	-5.02	101.78	109.76
1	A	1117	ARG	N-CA-C	-5.00	105.30	111.40

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	1039	LYS	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	2150	0	2114	97	0
2	A	141	0	0	8	0
All	All	2291	0	2114	97	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 23.

All (97) 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:A:1076:THR:O	1:A:1080:ARG:HA	1.75	0.86
1:A:1114:GLU:HG3	1:A:1117:ARG:HH21	1.43	0.83
1:A:1132:THR:HG21	2:A:64:HOH:O	1.78	0.81
1:A:1074:PRO:HG3	1:A:1119:LEU:HD13	1.64	0.80
1:A:1126:ARG:HG3	2:A:61:HOH:O	1.79	0.80
1:A:833:ARG:HH21	1:A:833:ARG:HG3	1.45	0.80
1:A:1114:GLU:HG3	1:A:1117:ARG:NH2	1.97	0.78
1:A:1002:LEU:O	1:A:1006:ILE:HG13	1.86	0.75
1:A:1047:PHE:H	1:A:1047:PHE:HD2	1.31	0.75
1:A:1144:HIS:HD2	1:A:1146:GLU:H	1.34	0.74
1:A:888:ILE:O	1:A:892:ILE:HD13	1.91	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1074:PRO:HG3	1:A:1119:LEU:CD1	2.22	0.69
1:A:1066:ARG:O	1:A:1068:PRO:HD3	1.92	0.69
1:A:899:VAL:HG21	1:A:1045:CYS:HB3	1.77	0.66
1:A:1066:ARG:HD2	1:A:1071:TRP:CH2	2.31	0.65
1:A:1072:MET:HE3	1:A:1076:THR:HG22	1.79	0.64
1:A:1074:PRO:O	1:A:1078:PHE:HD1	1.80	0.64
1:A:822:TYR:HB2	1:A:887:LYS:HE2	1.79	0.64
1:A:1132:THR:CG2	1:A:1134:GLU:HG2	2.27	0.63
1:A:1022:ARG:HA	1:A:1022:ARG:HE	1.64	0.63
1:A:833:ARG:HG3	1:A:833:ARG:NH2	2.15	0.62
1:A:925:SER:HB2	1:A:1066:ARG:NH1	2.15	0.61
1:A:870:LEU:HD11	1:A:879:HIS:HA	1.81	0.60
1:A:1096:TRP:CD1	1:A:1128:PRO:HG3	2.37	0.60
1:A:1032:ARG:HH21	1:A:1066:ARG:HD2	1.67	0.59
1:A:1112:ASP:O	1:A:1115:PHE:HB3	2.02	0.59
1:A:831:ARG:NH2	1:A:907:LYS:O	2.35	0.59
1:A:925:SER:HB2	1:A:1066:ARG:HH12	1.69	0.57
1:A:923:ASN:HA	1:A:1034:ILE:O	2.04	0.57
1:A:899:VAL:O	1:A:1047:PHE:HZ	1.88	0.57
1:A:1144:HIS:CD2	1:A:1146:GLU:H	2.18	0.57
1:A:925:SER:CB	1:A:1066:ARG:NH1	2.68	0.56
1:A:1032:ARG:HD3	1:A:1066:ARG:HG3	1.88	0.55
1:A:1032:ARG:CD	1:A:1066:ARG:HG3	2.36	0.55
1:A:1034:ILE:HG22	1:A:1042:VAL:HG22	1.88	0.55
1:A:831:ARG:NH1	1:A:911:PRO:O	2.41	0.54
1:A:1144:HIS:HB3	1:A:1150:ARG:HG2	1.89	0.54
1:A:1114:GLU:O	1:A:1118:ARG:HG3	2.09	0.53
1:A:1100:SER:HB3	1:A:1128:PRO:HB3	1.89	0.53
1:A:898:VAL:HB	1:A:1047:PHE:CE1	2.45	0.52
1:A:830:PRO:HG2	1:A:833:ARG:HB2	1.91	0.52
1:A:1085:GLN:NE2	2:A:58:HOH:O	2.44	0.51
1:A:1014:LYS:HD2	2:A:124:HOH:O	2.12	0.50
1:A:833:ARG:HD3	1:A:854:PHE:O	2.11	0.49
1:A:1076:THR:O	1:A:1080:ARG:HD2	2.12	0.49
1:A:836:LEU:HD23	1:A:851:ALA:HB2	1.94	0.48
1:A:1010:PHE:CZ	1:A:1014:LYS:HE2	2.48	0.48
1:A:1072:MET:CE	1:A:1076:THR:HG22	2.43	0.48
1:A:1131:THR:HG21	1:A:1139:MET:HE1	1.95	0.48
1:A:836:LEU:HB2	2:A:52:HOH:O	2.14	0.48
1:A:1078:PHE:HZ	1:A:1116:CYS:O	1.97	0.48
1:A:869:MET:HB3	1:A:913:MET:HG2	1.96	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1005:LEU:HG	1:A:1098:ILE:HG22	1.96	0.47
1:A:1081:VAL:HA	2:A:114:HOH:O	2.14	0.47
1:A:833:ARG:NH2	1:A:833:ARG:CG	2.77	0.47
1:A:1047:PHE:CD2	1:A:1047:PHE:N	2.72	0.47
1:A:1074:PRO:O	1:A:1078:PHE:CD1	2.66	0.47
1:A:1126:ARG:HD2	1:A:1127:ALA:O	2.15	0.47
1:A:1099:PHE:CE1	1:A:1135:MET:HE2	2.50	0.46
1:A:1032:ARG:NH2	1:A:1066:ARG:HB3	2.31	0.46
1:A:1132:THR:HG21	1:A:1134:GLU:HG2	1.97	0.46
1:A:847:GLN:HE21	1:A:847:GLN:HB3	1.61	0.46
1:A:1032:ARG:NH2	1:A:1066:ARG:HD2	2.31	0.46
1:A:1153:PHE:O	1:A:1157:VAL:HG23	2.16	0.45
1:A:1045:CYS:HA	1:A:1047:PHE:CD2	2.51	0.45
1:A:1066:ARG:C	1:A:1068:PRO:HD3	2.42	0.45
1:A:843:GLY:O	1:A:871:LYS:NZ	2.46	0.44
1:A:1106:TYR:CE2	1:A:1125:MET:HG3	2.52	0.44
1:A:1126:ARG:HD2	1:A:1126:ARG:C	2.43	0.44
1:A:1033:ASN:O	1:A:1034:ILE:HD13	2.18	0.44
1:A:1078:PHE:CZ	1:A:1116:CYS:O	2.71	0.44
1:A:936:VAL:O	1:A:1001:THR:HA	2.17	0.43
1:A:1019:LEU:HD21	1:A:1047:PHE:HD1	1.83	0.43
1:A:899:VAL:CG2	1:A:1045:CYS:HB3	2.44	0.43
1:A:1032:ARG:HH21	1:A:1066:ARG:CD	2.29	0.43
1:A:925:SER:CB	1:A:1066:ARG:HH11	2.31	0.43
1:A:1144:HIS:O	1:A:1150:ARG:NE	2.50	0.43
1:A:936:VAL:O	1:A:936:VAL:HG13	2.18	0.42
1:A:875:THR:HG22	1:A:878:GLU:OE2	2.19	0.42
1:A:1132:THR:HG22	1:A:1134:GLU:HG2	2.01	0.42
1:A:1032:ARG:HH21	1:A:1066:ARG:CG	2.32	0.42
1:A:839:PRO:HA	1:A:849:ILE:HA	2.02	0.41
1:A:899:VAL:O	1:A:1047:PHE:CZ	2.71	0.41
1:A:1066:ARG:NE	2:A:101:HOH:O	2.53	0.41
1:A:1016:MET:HE1	2:A:96:HOH:O	2.19	0.41
1:A:1079:ASP:OD2	1:A:1079:ASP:N	2.52	0.41
1:A:1022:ARG:HA	1:A:1022:ARG:NE	2.34	0.41
1:A:820:LEU:HD22	1:A:820:LEU:HA	1.83	0.41
1:A:1067:LEU:HD23	1:A:1067:LEU:HA	1.89	0.41
1:A:883:MET:O	1:A:886:LEU:HB3	2.21	0.41
1:A:892:ILE:HD13	1:A:892:ILE:H	1.85	0.41
1:A:1106:TYR:N	1:A:1107:PRO:HD3	2.35	0.41
1:A:877:SER:HA	1:A:880:ARG:HG2	2.02	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1025:ILE:HG23	1:A:1087:ASP:OD1	2.21	0.40
1:A:1164:LEU:O	1:A:1167:ASN:HB3	2.20	0.40
1:A:871:LYS:HE2	1:A:871:LYS:HB2	1.83	0.40
1:A:829:PHE:CZ	1:A:833:ARG:HB3	2.57	0.40

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	269/316 (85%)	248 (92%)	20 (7%)	1 (0%)	30 43

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1111	ILE

### 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	227/274 (83%)	200 (88%)	27 (12%)	5 7

All (27) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	820	LEU
1	A	821	PRO
1	A	833	ARG
1	A	847	GLN
1	A	849	ILE
1	A	852	ASP
1	A	862	CYS
1	A	871	LYS
1	A	872	GLU
1	A	876	HIS
1	A	880	ARG
1	A	892	ILE
1	A	912	LEU
1	A	937	PRO
1	A	1005	LEU
1	A	1022	ARG
1	A	1037	SER
1	A	1042	VAL
1	A	1047	PHE
1	A	1067	LEU
1	A	1079	ASP
1	A	1084	ILE
1	A	1094	LEU
1	A	1119	LEU
1	A	1131	THR
1	A	1132	THR
1	A	1134	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	847	GLN
1	A	1040	ASN
1	A	1085	GLN
1	A	1144	HIS
1	A	1159	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

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

### 6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

### 6.4 Ligands

EDS was not executed - this section is therefore empty.

### 6.5 Other polymers

EDS was not executed - this section is therefore empty.