



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 4, 2026 – 09:11 PM UTC

PDB ID : 7VCR / pdb_00007vcr
Title : Crystal Structure of PitA fragment from pilus islet-2 of Streptococcus oralis
Authors : Yadav, R.K.; Krishnan, V.
Deposited on : 2021-09-03
Resolution : 2.00 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

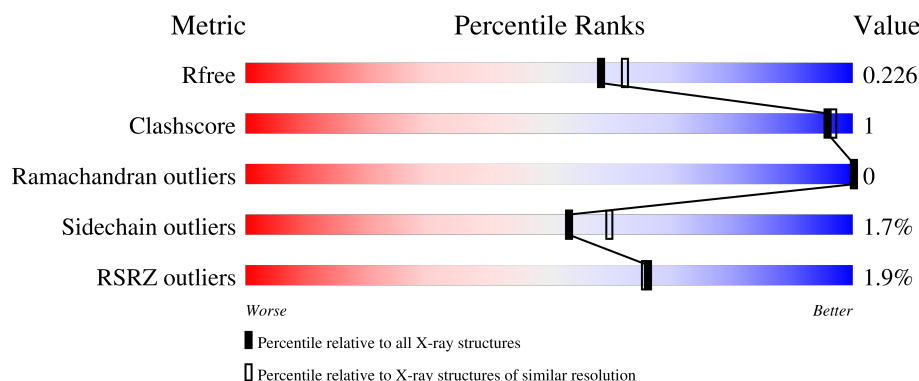
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.00 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	10052 (2.00-2.00)
Clashscore	190562	11152 (2.00-2.00)
Ramachandran outliers	187476	11031 (2.00-2.00)
Sidechain outliers	187428	11029 (2.00-2.00)
RSRZ outliers	180081	10067 (2.00-2.00)

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	C	30	7% 90% 10%
1	D	30	3% 90% 10%
2	A	466	% 94% 5%
2	B	466	2% 91% 6%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 7970 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 von Willebrand factor type A domain protein.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
1	C	30	Total	C	N	O	0	0	0
			233	145	37	51			
1	D	30	Total	C	N	O	0	0	0
			233	145	37	51			

- Molecule 2 is a protein called von Willebrand factor type A domain protein.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	A	460	Total	C	N	O	0	0	0
			3588	2232	617	739			
2	B	452	Total	C	N	O	0	0	0
			3532	2199	605	728			

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	C	22	Total	O	0	0
			22	22		
3	A	249	Total	O	0	0
			249	249		
3	D	12	Total	O	0	0
			12	12		
3	B	101	Total	O	0	0
			101	101		

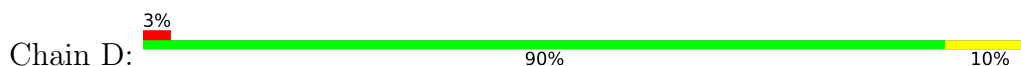
3 Residue-property plots [i](#)

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.

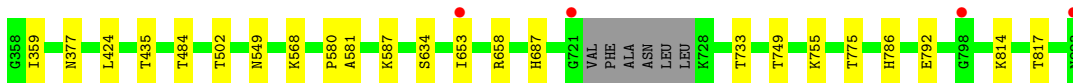
- Molecule 1: von Willebrand factor type A domain protein



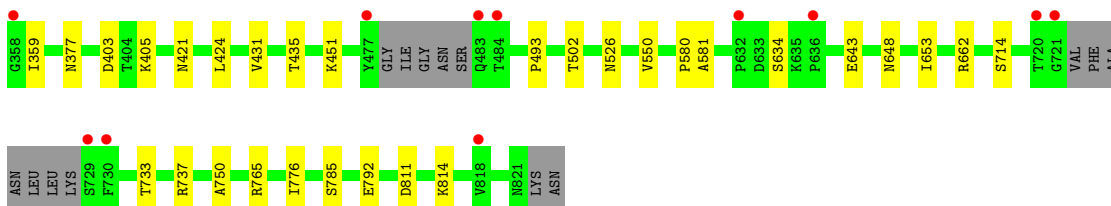
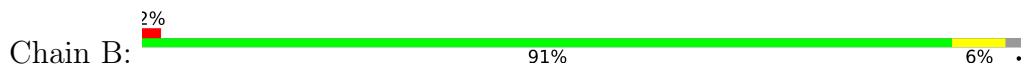
- Molecule 1: von Willebrand factor type A domain protein



- Molecule 2: von Willebrand factor type A domain protein



- Molecule 2: von Willebrand factor type A domain protein



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	61.48Å 70.88Å 82.47Å 80.09° 87.02° 87.70°	Depositor
Resolution (Å)	69.88 – 2.00 69.88 – 2.00	Depositor EDS
% Data completeness (in resolution range)	90.3 (69.88-2.00) 90.3 (69.88-2.00)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.73 (at 2.00Å)	Xtriage
Refinement program	REFMAC 5.8.0267	Depositor
R, R_{free}	0.201 , 0.234 (Not available) , 0.226	Depositor DCC
R_{free} test set	4294 reflections (4.64%)	wwPDB-VP
Wilson B-factor (Å ²)	37.6	Xtriage
Anisotropy	0.681	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 37.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	7970	wwPDB-VP
Average B, all atoms (Å ²)	57.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.00% 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

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	C	1.10	1/236 (0.4%)	1.48	1/320 (0.3%)
1	D	0.77	0/236	1.27	0/320
2	A	0.90	2/3645 (0.1%)	1.34	11/4931 (0.2%)
2	B	0.70	0/3588	1.18	10/4855 (0.2%)
All	All	0.82	3/7705 (0.0%)	1.27	22/10426 (0.2%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	786	HIS	CE1-NE2	5.32	1.37	1.32
2	A	687	HIS	CE1-NE2	5.25	1.37	1.32
1	C	57	ASP	CG-OD2	5.14	1.35	1.25

All (22) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	377	ASN	CB-CA-C	-7.47	101.20	112.11
2	A	733	THR	CB-CA-C	6.37	120.19	109.48
1	C	50	THR	CA-CB-OG1	-6.33	100.11	109.60
2	B	648	ASN	CA-CB-CG	-6.32	106.28	112.60
2	B	377	ASN	CB-CA-C	-6.30	103.42	111.86
2	A	435	THR	CA-CB-OG1	-6.21	100.29	109.60
2	B	435	THR	CA-CB-OG1	-6.12	100.41	109.60
2	A	549	ASN	CA-CB-CG	-5.85	106.75	112.60
2	B	403	ASP	CA-CB-CG	5.75	118.35	112.60
2	A	775	THR	CA-C-N	-5.44	116.09	123.10
2	A	775	THR	C-N-CA	-5.44	116.09	123.10
2	A	733	THR	CA-CB-OG1	-5.27	101.69	109.60
2	A	749	THR	CA-CB-OG1	-5.26	101.71	109.60
2	B	811	ASP	CA-C-N	5.24	129.35	120.86
2	B	811	ASP	C-N-CA	5.24	129.35	120.86
2	B	792	GLU	CB-CA-C	5.14	118.44	109.65
2	A	817	THR	CA-CB-OG1	-5.11	101.93	109.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	662	ARG	CA-C-N	5.10	125.54	121.61
2	B	662	ARG	C-N-CA	5.10	125.54	121.61
2	A	484	THR	CA-CB-OG1	-5.07	102.00	109.60
2	A	792	GLU	CB-CA-C	5.03	118.25	109.65
2	B	733	THR	CB-CA-C	5.01	117.90	109.48

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	C	233	0	227	0	0
1	D	233	0	227	2	0
2	A	3588	0	3546	6	0
2	B	3532	0	3485	9	0
3	A	249	0	0	2	0
3	B	101	0	0	0	0
3	C	22	0	0	0	0
3	D	12	0	0	0	0
All	All	7970	0	7485	16	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 1.

All (16) 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:359:ILE:HD11	2:A:424:LEU:HD12	1.74	0.70
1:D:49:ILE:HG22	2:B:493:PRO:HB2	1.88	0.55
2:A:580:PRO:O	2:A:581:ALA:HB3	2.12	0.49
2:B:359:ILE:HD11	2:B:424:LEU:HD12	1.95	0.49
2:B:580:PRO:O	2:B:581:ALA:HB3	2.12	0.49
2:A:568:LYS:NZ	3:A:908:HOH:O	2.47	0.48
2:B:814:LYS:HA	2:B:814:LYS:HD3	1.85	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:359:ILE:HD11	2:A:424:LEU:CD1	2.46	0.45
2:B:526:ASN:HB2	2:B:550:VAL:O	2.17	0.45
2:A:587:LYS:HB2	2:A:587:LYS:HE3	1.76	0.44
2:A:814:LYS:NZ	3:A:902:HOH:O	2.39	0.44
1:D:64:ASP:C	1:D:64:ASP:OD1	2.62	0.43
2:B:750:ALA:HB1	2:B:776:ILE:HD11	2.01	0.43
2:B:765:ARG:HB2	2:B:765:ARG:CZ	2.48	0.43
2:B:737:ARG:O	2:B:785:SER:HB2	2.20	0.41
2:B:714:SER:HA	2:B:776:ILE:O	2.22	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	C	28/30 (93%)	28 (100%)	0	0	100	100
1	D	28/30 (93%)	28 (100%)	0	0	100	100
2	A	456/466 (98%)	447 (98%)	9 (2%)	0	100	100
2	B	446/466 (96%)	438 (98%)	8 (2%)	0	100	100
All	All	958/992 (97%)	941 (98%)	17 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	C	28/29 (97%)	27 (96%)	1 (4%)	31	31
1	D	28/29 (97%)	27 (96%)	1 (4%)	31	31
2	A	408/413 (99%)	403 (99%)	5 (1%)	63	70
2	B	402/413 (97%)	394 (98%)	8 (2%)	48	54
All	All	866/884 (98%)	851 (98%)	15 (2%)	53	60

All (15) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	68	LYS
2	A	502	THR
2	A	634	SER
2	A	653	ILE
2	A	658	ARG
2	A	755	LYS
1	D	68	LYS
2	B	405	LYS
2	B	421	ASN
2	B	431	VAL
2	B	451	LYS
2	B	502	THR
2	B	634	SER
2	B	643	GLU
2	B	653	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
2	A	549	ASN
2	A	555	ASN
2	A	562	ASN
2	A	693	GLN
2	A	771	ASN
2	B	526	ASN
2	B	562	ASN
2	B	763	ASN
2	B	771	ASN

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	C	30/30 (100%)	-0.22	2 (6%) 24 22	30, 40, 79, 86	0
1	D	30/30 (100%)	0.10	1 (3%) 49 48	41, 53, 90, 107	0
2	A	460/466 (98%)	-0.25	4 (0%) 81 80	27, 43, 81, 133	0
2	B	452/466 (96%)	0.20	11 (2%) 59 59	37, 62, 114, 144	0
All	All	972/992 (97%)	-0.03	18 (1%) 66 66	27, 52, 104, 144	0

All (18) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	69	LEU	4.2
2	B	721	GLY	3.6
2	B	477	TYR	3.2
2	A	721	GLY	2.7
2	A	798	GLY	2.6
1	C	69	LEU	2.5
2	B	483	GLN	2.5
2	A	823	ASN	2.4
2	B	730	PHE	2.4
2	B	818	VAL	2.2
1	C	41	PRO	2.2
2	B	484	THR	2.2
2	B	636	PRO	2.2
2	B	358	GLY	2.2
2	B	632	PRO	2.1
2	B	720	THR	2.1
2	A	653	ILE	2.1
2	B	729	SER	2.1

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.