



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 19, 2026 – 11:01 AM UTC

PDB ID : 1QC5 / pdb_00001qc5
Title : I Domain from Integrin Alpha1-Beta1
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Deposited on : 1999-05-17
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) : **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

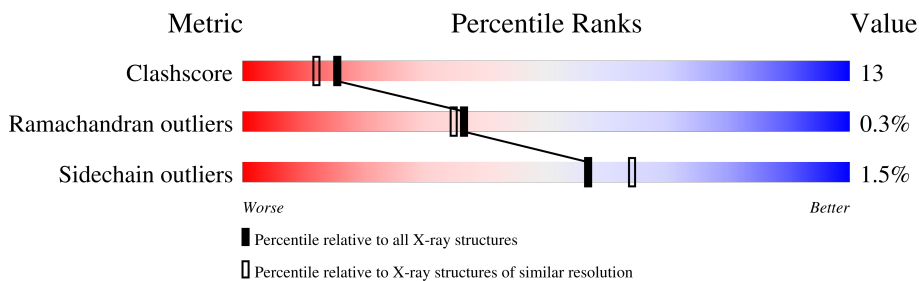
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.00 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))
Clashscore	190562	11152 (2.00-2.00)
Ramachandran outliers	187476	11031 (2.00-2.00)
Sidechain outliers	187428	11029 (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 $\leq 5\%$.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	192	 79% 18% ..
2	B	192	 76% 22% ..

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 3239 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 (ALPHA1 BETA1 INTEGRIN).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	192	Total	C	N	O	S	0	0	0
			1510	942	265	299	4			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	60	GLU	LYS	engineered mutation	UNP P56199
A	208	ILE	LEU	engineered mutation	UNP P56199

- Molecule 2 is a protein called PROTEIN (ALPHA1 BETA1 INTEGRIN).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	190	Total	C	N	O	S	0	0	0
			1498	937	263	294	4			

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	360	GLU	LYS	engineered mutation	UNP P56199
B	416	ILE	THR	engineered mutation	UNP P56199
B	508	ILE	LEU	engineered mutation	UNP P56199

- Molecule 3 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Mg	0	0
			1	1		
3	B	1	Total	Mg	0	0
			1	1		

- Molecule 4 is water.

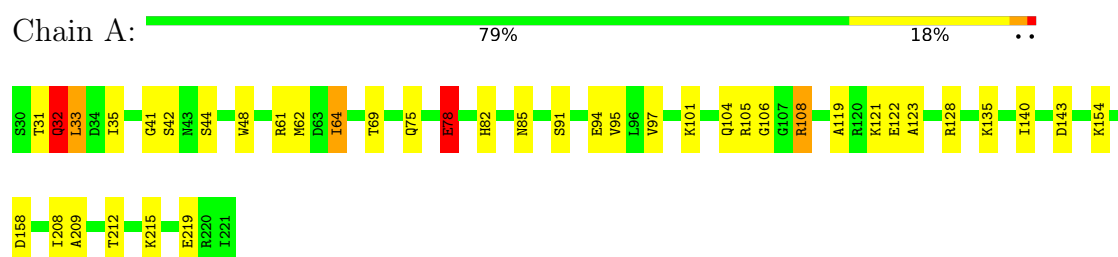
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	113	Total 113	O 113	0	0
4	B	116	Total 116	O 116	0	0

3 Residue-property plots [i](#)

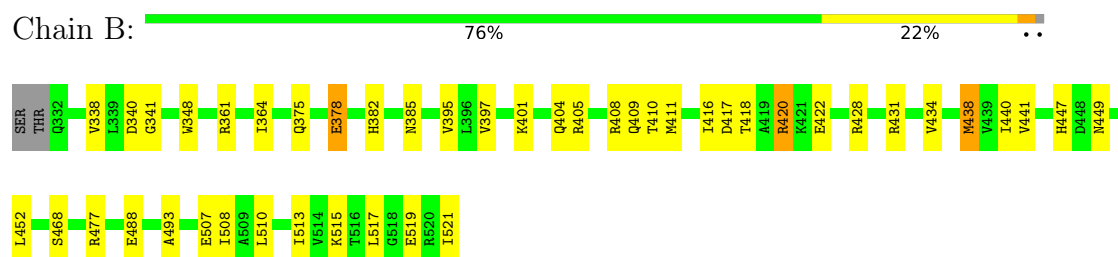
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded 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 (ALPHA1 BETA1 INTEGRIN)



• Molecule 2: PROTEIN (ALPHA1 BETA1 INTEGRIN)



4 Data and refinement statistics

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

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	37.44Å 96.35Å 53.27Å 90.00° 104.28° 90.00°	Depositor
Resolution (Å)	100.00 – 2.00	Depositor
% Data completeness (in resolution range)	99.1 (100.00-2.00)	Depositor
R_{merge}	0.06	Depositor
R_{sym}	0.06	Depositor
Refinement program	CNS 0.4	Depositor
R, R_{free}	0.206 , 0.243	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	3239	wwPDB-VP
Average B, all atoms (Å ²)	23.0	wwPDB-VP

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: MG

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	0.43	0/1529	0.90	4/2061 (0.2%)
2	B	0.44	1/1517 (0.1%)	0.90	4/2044 (0.2%)
All	All	0.44	1/3046 (0.0%)	0.90	8/4105 (0.2%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	438	MET	SD-CE	-6.68	1.62	1.79

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	378	GLU	N-CA-C	-6.88	104.70	113.23
2	B	441	VAL	O-C-N	-6.79	116.01	123.20
1	A	78	GLU	N-CA-C	-5.71	104.51	112.45
2	B	340	ASP	N-CA-C	-5.42	101.15	109.76
1	A	32	GLN	N-CA-C	-5.34	99.42	110.80
2	B	452	LEU	N-CA-C	5.34	117.52	111.11
1	A	33	LEU	N-CA-C	5.26	117.95	108.48
1	A	64	ILE	N-CA-C	5.22	116.10	108.58

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	1510	0	1514	38	0
2	B	1498	0	1506	43	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
4	A	113	0	0	1	0
4	B	116	0	0	1	0
All	All	3239	0	3020	81	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 13.

All (81) 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:411:MET:HE1	2:B:447:HIS:HB2	1.20	1.14
1:A:35:ILE:HD12	1:A:62:MET:HE1	1.28	1.09
2:B:420:ARG:HH11	2:B:420:ARG:HB3	1.19	1.02
1:A:78:GLU:H	1:A:78:GLU:CD	1.67	0.94
1:A:75:GLN:HE22	1:A:105:ARG:H	1.22	0.83
2:B:409:GLN:HB3	2:B:411:MET:HE3	1.59	0.82
1:A:44:SER:OG	1:A:143:ASP:OD1	1.97	0.82
2:B:416:ILE:HG23	2:B:438:MET:HE1	1.63	0.80
2:B:438:MET:HE2	2:B:440:ILE:HD11	1.65	0.79
2:B:411:MET:CE	2:B:447:HIS:HB2	2.08	0.78
1:A:75:GLN:NE2	1:A:105:ARG:H	1.82	0.77
1:A:31:THR:O	1:A:32:GLN:HG2	1.86	0.76
2:B:420:ARG:HB3	2:B:420:ARG:NH1	1.99	0.76
1:A:35:ILE:CD1	1:A:62:MET:HE1	2.13	0.75
1:A:91:SER:OG	1:A:94:GLU:HG3	1.87	0.74
2:B:338:VAL:HG21	2:B:438:MET:HE3	1.71	0.73
2:B:477:ARG:NH2	2:B:507:GLU:OE1	2.24	0.69
1:A:78:GLU:CD	1:A:78:GLU:N	2.48	0.69
1:A:62:MET:HE2	1:A:69:THR:HG21	1.75	0.68
1:A:97:VAL:HG12	1:A:101:LYS:HE3	1.75	0.68
2:B:361:ARG:NH1	2:B:515:LYS:HA	2.09	0.67
2:B:397:VAL:HG12	2:B:401:LYS:HE3	1.76	0.67
2:B:515:LYS:O	2:B:519:GLU:HG3	1.94	0.67
1:A:215:LYS:O	1:A:219:GLU:HG3	1.94	0.66
1:A:108:ARG:H	1:A:108:ARG:HD2	1.61	0.65
1:A:78:GLU:HB3	1:A:108:ARG:CZ	2.27	0.65

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:416:ILE:HG12	2:B:438:MET:HE1	1.80	0.64
1:A:41:GLY:HA3	1:A:75:GLN:HE21	1.63	0.63
1:A:82:HIS:HE1	1:A:122:GLU:OE1	1.81	0.63
2:B:431:ARG:O	2:B:434:VAL:HG22	1.99	0.62
2:B:375:GLN:NE2	2:B:405:ARG:H	1.97	0.62
2:B:361:ARG:HH12	2:B:515:LYS:HA	1.63	0.61
2:B:375:GLN:HE22	2:B:405:ARG:H	1.48	0.61
2:B:382:HIS:HE1	2:B:422:GLU:OE1	1.84	0.60
2:B:410:THR:C	2:B:411:MET:HE2	2.27	0.60
2:B:438:MET:HE2	2:B:440:ILE:CD1	2.31	0.59
1:A:108:ARG:H	1:A:108:ARG:CD	2.15	0.58
2:B:438:MET:HE2	2:B:440:ILE:CG1	2.34	0.57
2:B:364:ILE:HD13	2:B:395:VAL:HG21	1.86	0.56
1:A:41:GLY:O	1:A:106:GLY:HA2	2.07	0.55
1:A:33:LEU:HD12	1:A:135:LYS:HB3	1.89	0.55
2:B:378:GLU:HG2	2:B:409:GLN:HB2	1.89	0.55
2:B:420:ARG:HH11	2:B:420:ARG:CB	2.05	0.55
2:B:385:ASN:HB3	2:B:428:ARG:O	2.07	0.54
2:B:408:ARG:NH1	2:B:408:ARG:HB2	2.22	0.54
1:A:209:ALA:O	1:A:212:THR:HB	2.08	0.54
1:A:108:ARG:HD2	1:A:108:ARG:N	2.23	0.53
1:A:122:GLU:O	1:A:128:ARG:HD2	2.09	0.53
1:A:154:LYS:HE3	1:A:158:ASP:OD1	2.09	0.53
2:B:468:SER:OG	2:B:493:ALA:HB2	2.08	0.53
1:A:64:ILE:HD13	1:A:95:VAL:HG21	1.91	0.52
2:B:416:ILE:HG12	2:B:438:MET:CE	2.40	0.51
1:A:33:LEU:HD23	1:A:35:ILE:HD11	1.91	0.51
2:B:416:ILE:CG2	2:B:438:MET:HE1	2.37	0.51
1:A:208:ILE:HG23	4:A:699:HOH:O	2.11	0.51
1:A:140:ILE:N	1:A:140:ILE:HD12	2.27	0.49
2:B:417:ASP:OD2	2:B:420:ARG:NH1	2.45	0.49
1:A:78:GLU:HB3	1:A:108:ARG:NH1	2.27	0.48
1:A:85:ASN:HB3	1:A:128:ARG:O	2.14	0.48
2:B:341:GLY:HA3	2:B:375:GLN:HE21	1.79	0.47
1:A:61:ARG:NH1	1:A:215:LYS:HA	2.29	0.47
2:B:449:ASN:ND2	2:B:488:GLU:OE1	2.46	0.46
1:A:78:GLU:CB	1:A:108:ARG:CZ	2.93	0.46
1:A:97:VAL:O	1:A:101:LYS:HG3	2.16	0.46
2:B:408:ARG:HB2	2:B:408:ARG:CZ	2.46	0.46
2:B:422:GLU:O	2:B:428:ARG:HD2	2.16	0.45
1:A:48:TRP:CD2	1:A:104:GLN:HB2	2.51	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:517:LEU:O	2:B:521:ILE:HG13	2.16	0.45
2:B:510:LEU:O	2:B:513:ILE:HG12	2.16	0.44
1:A:75:GLN:HE22	1:A:105:ARG:N	2.03	0.43
2:B:382:HIS:HD2	4:B:612:HOH:O	2.01	0.43
1:A:61:ARG:HH12	1:A:215:LYS:HA	1.83	0.43
2:B:440:ILE:HD12	2:B:440:ILE:N	2.34	0.43
1:A:62:MET:CE	1:A:69:THR:HG21	2.45	0.42
2:B:348:TRP:CD2	2:B:404:GLN:HB2	2.55	0.42
2:B:416:ILE:CG1	2:B:438:MET:HE1	2.49	0.42
2:B:418:THR:O	2:B:422:GLU:HB2	2.21	0.41
2:B:397:VAL:O	2:B:401:LYS:HG3	2.20	0.40
1:A:119:ALA:O	1:A:123:ALA:HB3	2.22	0.40
2:B:408:ARG:NH1	2:B:408:ARG:CB	2.84	0.40
1:A:42:SER:O	1:A:104:GLN:NE2	2.55	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	190/192 (99%)	182 (96%)	7 (4%)	1 (0%)	24	21
2	B	188/192 (98%)	183 (97%)	5 (3%)	0	100	100
All	All	378/384 (98%)	365 (97%)	12 (3%)	1 (0%)	36	35

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	32	GLN

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	168/168 (100%)	165 (98%)	3 (2%)	51	58
2	B	166/168 (99%)	164 (99%)	2 (1%)	63	70
All	All	334/336 (99%)	329 (98%)	5 (2%)	57	64

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	78	GLU
1	A	108	ARG
1	A	121	LYS
2	B	420	ARG
2	B	508	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	56	ASN
1	A	70	GLN
1	A	75	GLN
1	A	82	HIS
1	A	157	GLN
2	B	343	ASN
2	B	370	GLN
2	B	375	GLN
2	B	382	HIS
2	B	476	ASN

5.3.3 RNA ⓘ

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](#)

Of 2 ligands modelled in this entry, 2 are monoatomic - leaving 0 for Mogul analysis.

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

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.