



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 14, 2026 – 10:48 AM UTC

PDB ID : 1HYN / pdb_00001hyn
Title : CRYSTAL STRUCTURE OF THE CYTOPLASMIC DOMAIN OF HUMAN ERYTHROCYTE BAND-3 PROTEIN
Authors : Zhang, D.; Kiyatkin, A.; Bolin, J.T.; Low, P.S.
Deposited on : 2001-01-20
Resolution : 2.60 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 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

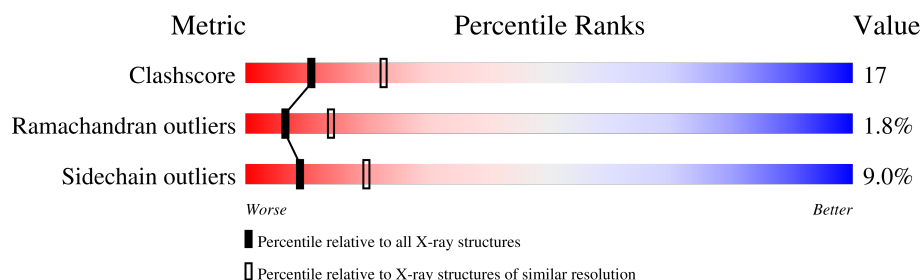
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.60 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	4347 (2.60-2.60)
Ramachandran outliers	187476	4277 (2.60-2.60)
Sidechain outliers	187428	4277 (2.60-2.60)

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	P	379	
1	Q	379	
1	R	379	
1	S	379	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 9698 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.

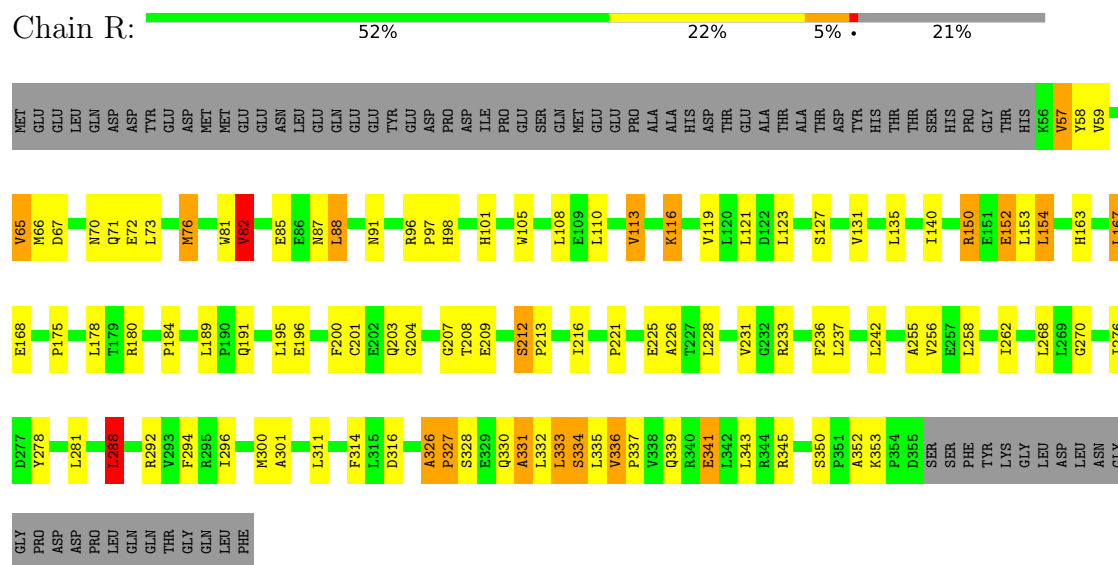
- Molecule 1 is a protein called BAND 3 ANION TRANSPORT PROTEIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	P	293	Total	C	N	O	S	0	0	0
			2318	1473	404	435	6			
1	Q	302	Total	C	N	O	S	0	0	0
			2382	1511	416	449	6			
1	R	300	Total	C	N	O	S	0	0	0
			2366	1502	412	446	6			
1	S	293	Total	C	N	O	S	0	0	0
			2318	1473	404	435	6			

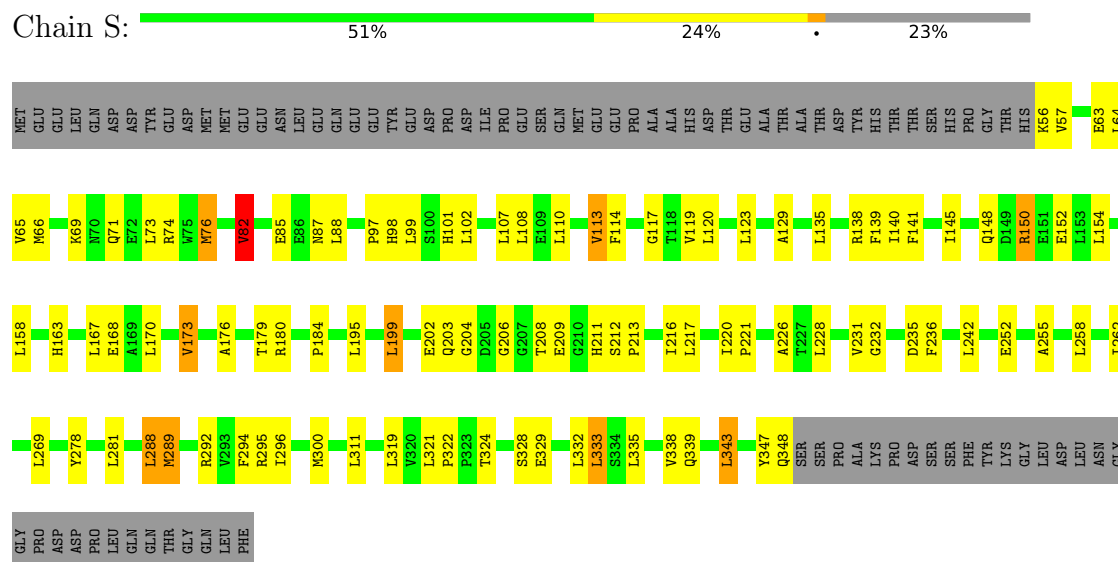
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	P	71	Total	O	0	0
			71	71		
2	Q	87	Total	O	0	0
			87	87		
2	R	87	Total	O	0	0
			87	87		
2	S	69	Total	O	0	0
			69	69		

● Molecule 1: BAND 3 ANION TRANSPORT PROTEIN



● Molecule 1: BAND 3 ANION TRANSPORT PROTEIN



4 Data and refinement statistics

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

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	181.59Å 92.58Å 123.33Å 90.00° 131.86° 90.00°	Depositor
Resolution (Å)	8.00 – 2.60	Depositor
% Data completeness (in resolution range)	99.0 (8.00-2.60)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	0.05	Depositor
Refinement program	X-PLOR	Depositor
R, R_{free}	0.216 , 0.290	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	9698	wwPDB-VP
Average B, all atoms (Å ²)	31.0	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	P	0.55	2/2366 (0.1%)	1.04	19/3213 (0.6%)
1	Q	0.53	1/2433 (0.0%)	1.02	8/3305 (0.2%)
1	R	0.53	1/2416 (0.0%)	1.09	21/3282 (0.6%)
1	S	0.55	2/2366 (0.1%)	1.03	13/3213 (0.4%)
All	All	0.54	6/9581 (0.1%)	1.04	61/13013 (0.5%)

The worst 5 of 6 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	S	76	MET	SD-CE	-7.75	1.60	1.79
1	R	76	MET	SD-CE	-7.65	1.60	1.79
1	S	289	MET	SD-CE	-6.96	1.62	1.79
1	P	76	MET	SD-CE	-6.58	1.63	1.79
1	Q	76	MET	SD-CE	-6.14	1.64	1.79

The worst 5 of 61 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	R	334	SER	N-CA-C	-10.21	100.56	113.43
1	Q	334	SER	N-CA-C	-9.17	101.99	113.55
1	S	117	GLY	N-CA-C	8.80	122.05	111.93
1	S	71	GLN	O-C-N	7.91	131.89	122.00
1	P	204	GLY	N-CA-C	-7.57	104.42	114.25

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	P	2318	0	2320	103	0
1	Q	2382	0	2378	105	0
1	R	2366	0	2366	83	0
1	S	2318	0	2320	84	0
2	P	71	0	0	3	0
2	Q	87	0	0	4	0
2	R	87	0	0	3	0
2	S	69	0	0	0	0
All	All	9698	0	9384	312	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 17.

The worst 5 of 312 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:S:73:LEU:HD13	1:S:184:PRO:HB3	1.29	1.11
1:R:73:LEU:HD13	1:R:184:PRO:HB3	1.30	1.08
1:Q:73:LEU:HD13	1:Q:184:PRO:HB3	1.36	1.07
1:S:87:ASN:HD21	1:S:98:HIS:HE1	1.12	0.98
1:P:73:LEU:O	1:P:159:LEU:HD13	1.66	0.95

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	P	291/379 (77%)	275 (94%)	14 (5%)	2 (1%)	18 38
1	Q	300/379 (79%)	279 (93%)	11 (4%)	10 (3%)	3 5

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	R	298/379 (79%)	280 (94%)	12 (4%)	6 (2%)	6	12
1	S	291/379 (77%)	275 (94%)	13 (4%)	3 (1%)	12	28
All	All	1180/1516 (78%)	1109 (94%)	50 (4%)	21 (2%)	6	14

5 of 21 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	R	327	PRO
1	Q	204	GLY
1	R	57	VAL
1	R	336	VAL
1	Q	56	LYS

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	P	251/327 (77%)	224 (89%)	27 (11%)	6	13
1	Q	259/327 (79%)	235 (91%)	24 (9%)	8	18
1	R	257/327 (79%)	237 (92%)	20 (8%)	11	26
1	S	251/327 (77%)	230 (92%)	21 (8%)	10	23
All	All	1018/1308 (78%)	926 (91%)	92 (9%)	9	20

5 of 92 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	R	135	LEU
1	S	64	LEU
1	R	154	LEU
1	R	288	LEU
1	S	135	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 33 such sidechains are listed below:

Mol	Chain	Res	Type
1	S	101	HIS
1	S	163	HIS
1	S	248	GLN
1	Q	87	ASN
1	Q	70	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

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.