



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 10, 2026 – 11:20 AM UTC

PDB ID : 9NQO / pdb_00009nqo
Title : Crystal structure of Galectin-3 in complex with FN3
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Deposited on : 2025-03-12
Resolution : 2.04 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
Mogul	:	NOT EXECUTED
Xtriage (Phenix)	:	2.0
EDS	:	NOT EXECUTED
Buster-report	:	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

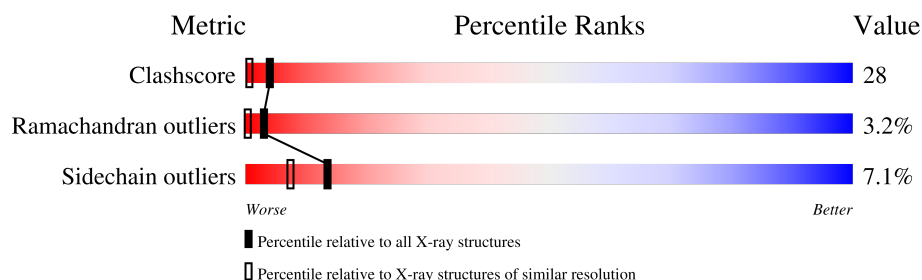
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.04 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	2333 (2.04-2.04)
Ramachandran outliers	187476	2318 (2.04-2.04)
Sidechain outliers	187428	2318 (2.04-2.04)

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	283	

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 1837 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.

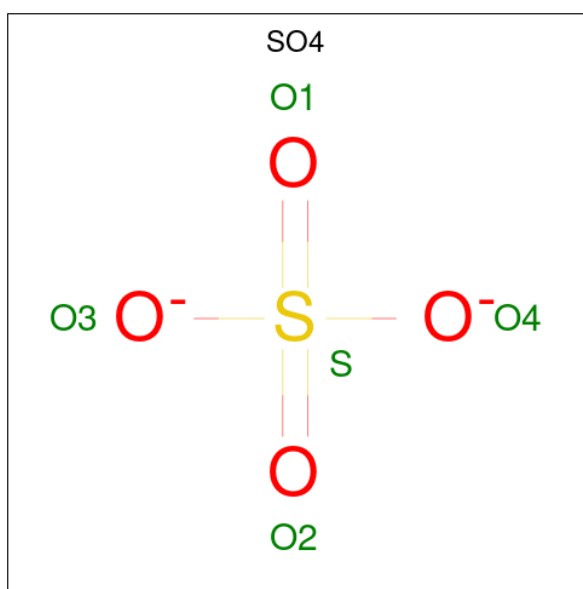
- Molecule 1 is a protein called Galectin-3, Galectin-3, Galectin-3 in complex FN3.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	226	Total	C	N	O	S	0	3	0
			1772	1139	297	332	4			

There are 5 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MET	-	initiating methionine	UNP P17931
A	2	GLY	-	expression tag	UNP P17931
A	3	SER	-	expression tag	UNP P17931
A	4	HIS	-	expression tag	UNP P17931
A	5	MET	-	expression tag	UNP P17931

- Molecule 2 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	O	S	0	0
			5	4	1		

- Molecule 3 is water.

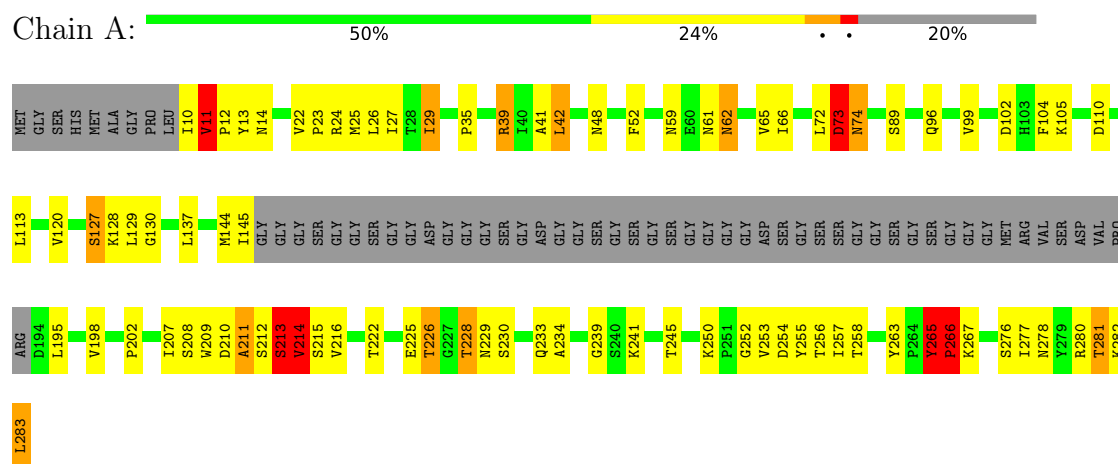
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	60	Total	O	0	0
			60	60		

3 Residue-property plots

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: Galectin-3,Galectin-3,Galectin-3 in complex FN3



4 Data and refinement statistics

EDS was not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	42.61Å 50.23Å 97.62Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	44.67 – 2.04	Depositor
% Data completeness (in resolution range)	99.8 (44.67-2.04)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.69 (at 2.05Å)	Xtriage
Refinement program	REFMAC 5.8.0425	Depositor
R, R_{free}	0.300 , 0.400	Depositor
Wilson B-factor (Å ²)	38.2	Xtriage
Anisotropy	0.154	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	1837	wwPDB-VP
Average B, all atoms (Å ²)	39.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.77% 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](#)

Bond lengths and bond angles in the following residue types are not validated in this section: SO4

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	0.60	0/1824	1.31	15/2489 (0.6%)

There are no bond length outliers.

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	265	TYR	CA-C-N	8.83	130.88	119.84
1	A	265	TYR	C-N-CA	8.83	130.88	119.84
1	A	213	SER	N-CA-C	-8.72	88.65	107.49
1	A	265	TYR	C-N-CD	-8.48	90.21	125.00
1	A	11	VAL	CA-C-N	-7.41	112.12	119.90
1	A	11	VAL	C-N-CA	-7.41	112.12	119.90
1	A	266	PRO	CA-N-CD	-6.90	102.33	112.00
1	A	214	VAL	N-CA-C	6.57	123.00	109.34
1	A	228	THR	CA-CB-OG1	-6.53	99.81	109.60
1	A	104	PHE	CA-CB-CG	6.44	120.24	113.80
1	A	42	LEU	N-CA-CB	5.47	119.34	110.43
1	A	52	PHE	CA-CB-CG	5.37	119.17	113.80
1	A	281	THR	N-CA-CB	-5.23	103.21	110.38
1	A	11	VAL	N-CA-C	-5.14	97.79	108.88
1	A	226	THR	CA-CB-OG1	-5.12	101.92	109.60

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	1772	0	1764	99	0
2	A	5	0	0	0	0
3	A	60	0	0	27	0
All	All	1837	0	1764	99	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 28.

All (99) 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:228:THR:HG22	1:A:230:SER:H	1.26	0.98
1:A:26:LEU:HB3	3:A:424:HOH:O	1.65	0.95
1:A:245:THR:HB	3:A:429:HOH:O	1.66	0.94
1:A:283:LEU:HD23	3:A:445:HOH:O	1.70	0.91
1:A:13:TYR:OH	3:A:401:HOH:O	1.89	0.90
1:A:66:ILE:CD1	1:A:113:LEU:HD21	2.04	0.86
1:A:128:LYS:HE2	3:A:433:HOH:O	1.73	0.86
1:A:207:ILE:HB	3:A:404:HOH:O	1.75	0.86
1:A:282:LYS:O	1:A:283:LEU:HB2	1.75	0.84
1:A:252:GLY:H	1:A:281:THR:HG23	1.43	0.82
1:A:195:LEU:HD12	3:A:404:HOH:O	1.78	0.81
1:A:250:LYS:O	1:A:281:THR:HG21	1.81	0.81
1:A:245:THR:HG22	3:A:414:HOH:O	1.81	0.79
1:A:11:VAL:HB	1:A:12:PRO:CD	2.13	0.78
1:A:144:MET:SD	3:A:452:HOH:O	2.42	0.78
1:A:226:THR:HG22	1:A:256:THR:OG1	1.87	0.73
1:A:25:MET:HE3	1:A:27:ILE:HD11	1.69	0.73
1:A:26:LEU:CB	3:A:424:HOH:O	2.27	0.73
1:A:265:TYR:CG	1:A:266:PRO:CD	2.73	0.70
1:A:228:THR:HG22	1:A:230:SER:N	2.06	0.69
1:A:66:ILE:HD13	1:A:113:LEU:HD21	1.73	0.69
1:A:283:LEU:HD11	3:A:460:HOH:O	1.93	0.67
1:A:29[A]:ILE:CD1	1:A:137:LEU:CD1	2.74	0.66
1:A:72:LEU:HD21	1:A:120:VAL:HG22	1.76	0.65
1:A:11:VAL:HB	1:A:12:PRO:HD3	1.79	0.64
1:A:59:ASN:OD1	1:A:62:ASN:HA	1.99	0.62
1:A:265:TYR:CD2	1:A:266:PRO:HD3	2.34	0.62
1:A:99:VAL:HG13	3:A:409:HOH:O	1.98	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:252:GLY:N	1:A:281:THR:HG23	2.15	0.60
1:A:228:THR:HG21	3:A:444:HOH:O	2.01	0.60
1:A:22:VAL:HG22	1:A:23:PRO:HD2	1.84	0.59
1:A:226:THR:HG21	1:A:254:ASP:OD2	2.04	0.58
1:A:265:TYR:CG	1:A:266:PRO:HD3	2.38	0.57
1:A:25:MET:CE	1:A:27:ILE:HD11	2.34	0.57
1:A:11:VAL:CB	1:A:12:PRO:HD3	2.35	0.56
1:A:225:GLU:HB2	1:A:228:THR:HB	1.87	0.56
1:A:72:LEU:HD21	1:A:120:VAL:CG2	2.36	0.56
1:A:11:VAL:CB	1:A:12:PRO:CD	2.83	0.56
1:A:42:LEU:HB3	1:A:129:LEU:HD11	1.88	0.55
1:A:228:THR:HG22	1:A:229:ASN:N	2.21	0.55
1:A:195:LEU:CD1	3:A:404:HOH:O	2.45	0.55
1:A:29[A]:ILE:HD13	1:A:137:LEU:CD1	2.37	0.55
1:A:39:ARG:NH1	1:A:41:ALA:HB2	2.22	0.54
1:A:127:SER:CB	3:A:441:HOH:O	2.53	0.54
1:A:22:VAL:CG2	1:A:23:PRO:HD2	2.36	0.54
1:A:214:VAL:HB	3:A:427:HOH:O	2.06	0.54
1:A:255:TYR:O	1:A:278:ASN:HA	2.08	0.54
1:A:258:THR:OG1	1:A:276:SER:HB3	2.08	0.53
1:A:265:TYR:CD2	1:A:266:PRO:CD	2.92	0.53
1:A:241:LYS:HD2	3:A:411:HOH:O	2.10	0.52
1:A:265:TYR:CG	1:A:266:PRO:HD2	2.45	0.51
1:A:11:VAL:CG1	1:A:12:PRO:HD3	2.41	0.51
1:A:39:ARG:HH12	1:A:41:ALA:HB2	1.76	0.50
1:A:228:THR:CG2	1:A:229:ASN:N	2.75	0.50
1:A:210:ASP:O	1:A:211:ALA:O	2.30	0.50
1:A:48:ASN:O	1:A:48:ASN:ND2	2.45	0.49
1:A:222:THR:HG22	1:A:234:ALA:HB2	1.95	0.49
1:A:72:LEU:O	1:A:73:ASP:C	2.55	0.49
1:A:253:VAL:H	1:A:281:THR:HG22	1.76	0.49
1:A:27:ILE:O	1:A:96:GLN:HA	2.13	0.48
1:A:252:GLY:H	1:A:281:THR:CG2	2.22	0.48
1:A:59:ASN:HB3	3:A:417:HOH:O	2.14	0.48
1:A:228:THR:CG2	3:A:444:HOH:O	2.59	0.48
1:A:208:SER:N	3:A:404:HOH:O	2.47	0.47
1:A:10:ILE:HD12	3:A:415:HOH:O	2.14	0.47
1:A:11:VAL:HG12	1:A:12:PRO:HD3	1.96	0.47
1:A:73:ASP:O	1:A:74:ASN:CB	2.61	0.46
1:A:105:LYS:HB3	1:A:105:LYS:HE2	1.82	0.46
1:A:252:GLY:N	1:A:281:THR:CG2	2.78	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:26:LEU:HD11	1:A:96:GLN:HB3	1.97	0.45
1:A:282:LYS:O	1:A:283:LEU:CB	2.54	0.45
1:A:110:ASP:HB3	1:A:265:TYR:CD1	2.51	0.45
1:A:214:VAL:HG13	1:A:239:GLY:O	2.17	0.45
1:A:29[A]:ILE:CD1	1:A:137:LEU:HD13	2.47	0.45
1:A:283:LEU:C	3:A:434:HOH:O	2.59	0.44
1:A:214:VAL:HA	3:A:416:HOH:O	2.18	0.44
1:A:65:VAL:HG12	3:A:407:HOH:O	2.18	0.44
1:A:23:PRO:O	1:A:24:ARG:HB2	2.18	0.43
1:A:61:ASN:O	1:A:62:ASN:HB2	2.18	0.43
1:A:265:TYR:CB	1:A:266:PRO:HD2	2.47	0.43
1:A:210:ASP:O	1:A:211:ALA:C	2.60	0.43
1:A:216:VAL:O	1:A:239:GLY:HA3	2.18	0.43
1:A:29[A]:ILE:HD13	1:A:137:LEU:HD13	2.00	0.43
1:A:145:ILE:HG13	3:A:424:HOH:O	2.19	0.43
1:A:35:PRO:O	1:A:89:SER:OG	2.36	0.42
1:A:265:TYR:C	1:A:267:LYS:H	2.27	0.42
1:A:14:ASN:ND2	1:A:130:GLY:HA2	2.34	0.42
1:A:263:TYR:CD1	1:A:263:TYR:N	2.87	0.42
1:A:10:ILE:HD13	1:A:10:ILE:N	2.34	0.41
1:A:102:ASP:OD1	1:A:102:ASP:N	2.53	0.41
1:A:213:SER:O	1:A:215:SER:N	2.53	0.41
1:A:202:PRO:HG3	1:A:283:LEU:HD13	2.01	0.41
1:A:257:ILE:O	1:A:276:SER:CB	2.69	0.41
1:A:253:VAL:O	1:A:280:ARG:HA	2.21	0.41
1:A:127:SER:HB2	3:A:441:HOH:O	2.19	0.40
1:A:228:THR:CG2	1:A:229:ASN:H	2.34	0.40
1:A:226:THR:HG22	1:A:256:THR:HG1	1.82	0.40
1:A:22:VAL:HG22	1:A:23:PRO:CD	2.50	0.40
1:A:209:TRP:HD1	3:A:438:HOH:O	2.04	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	225/283 (80%)	212 (94%)	6 (3%)	7 (3%)	3 0

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	11	VAL
1	A	211	ALA
1	A	214	VAL
1	A	265	TYR
1	A	266	PRO
1	A	73	ASP
1	A	62	ASN

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	199/229 (87%)	184 (92%)	15 (8%)	12 6

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

Mol	Chain	Res	Type
1	A	11	VAL
1	A	29[A]	ILE
1	A	29[B]	ILE
1	A	39	ARG
1	A	73	ASP
1	A	74	ASN
1	A	127	SER
1	A	198	VAL
1	A	212	SER
1	A	213	SER
1	A	214	VAL
1	A	233	GLN

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Mol	Chain	Res	Type
1	A	266	PRO
1	A	277	ILE
1	A	283	LEU

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	14	ASN
1	A	36	ASN
1	A	48	ASN
1	A	103	HIS
1	A	233	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

Mogul was not executed - this section is therefore empty.

5.5 Carbohydrates [i](#)

Mogul was not executed - this section is therefore empty.

5.6 Ligand geometry [i](#)

Mogul was not executed - this section is therefore empty.

5.7 Other polymers [i](#)

Mogul was not executed - this section is therefore empty.

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.