



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 5, 2026 – 04:07 AM UTC

PDB ID : 1NL0 / pdb_00001nl0
Title : Crystal structure of human factor IX Gla domain in complex of an inhibitory antibody, 10C12
Authors : Huang, M.; Furie, B.C.; Furie, B.
Deposited on : 2003-01-06
Resolution : 2.20 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
Mogul	:	2022.3.0, CSD as543be (2022)
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

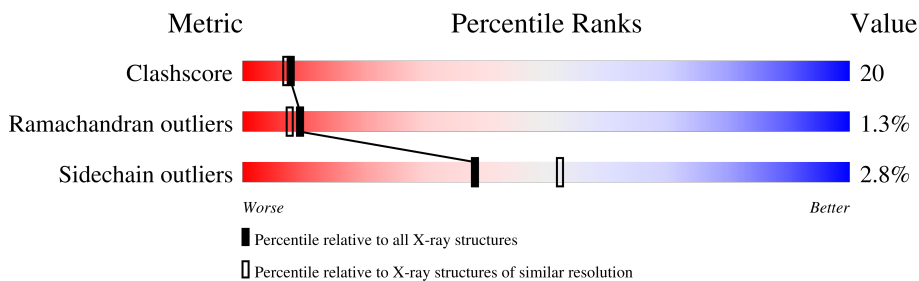
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.20 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	6851 (2.20-2.20)
Ramachandran outliers	187476	6768 (2.20-2.20)
Sidechain outliers	187428	6769 (2.20-2.20)

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	L	213	 67% 29% . .
2	H	224	 64% 31% . .
3	G	51	 49% 37% . 12%

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 3799 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 anti-factor IX antibody, 10C12, chain L.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	L	213	Total	C	N	O	S	0	0	0
			1592	997	262	328	5			

- Molecule 2 is a protein called anti-factor IX antibody, 10C12, chain H.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	H	216	Total	C	N	O	S	0	0	0
			1624	1026	278	312	8			

- Molecule 3 is a protein called factor IX.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	G	45	Total	C	N	O	S	0	0	0
			424	253	63	105	3			

There are 18 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
G	7	CGU	GLU	modified residue	UNP P00740
G	8	CGU	GLU	modified residue	UNP P00740
G	15	CGU	GLU	modified residue	UNP P00740
G	17	CGU	GLU	modified residue	UNP P00740
G	20	CGU	GLU	modified residue	UNP P00740
G	21	CGU	GLU	modified residue	UNP P00740
G	26	CGU	GLU	modified residue	UNP P00740
G	27	CGU	GLU	modified residue	UNP P00740
G	30	CGU	GLU	modified residue	UNP P00740
G	33	CGU	GLU	modified residue	UNP P00740
G	36	CGU	GLU	modified residue	UNP P00740
G	40	CGU	GLU	modified residue	UNP P00740
G	46	CGU	-	cloning artifact	UNP P00740
G	47	CGU	-	cloning artifact	UNP P00740

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Chain	Residue	Modelled	Actual	Comment	Reference
G	48	CGU	-	cloning artifact	UNP P00740
G	49	CGU	-	cloning artifact	UNP P00740
G	50	CGU	-	cloning artifact	UNP P00740
G	51	CGU	-	cloning artifact	UNP P00740

- Molecule 4 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



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

- Molecule 5 is CALCIUM ION (CCD ID: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	G	6	Total	Ca	0	0
			6	6		

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	L	84	Total	O	0	0
			84	84		
6	H	50	Total	O	0	0
			50	50		
6	G	14	Total	O	0	0
			14	14		

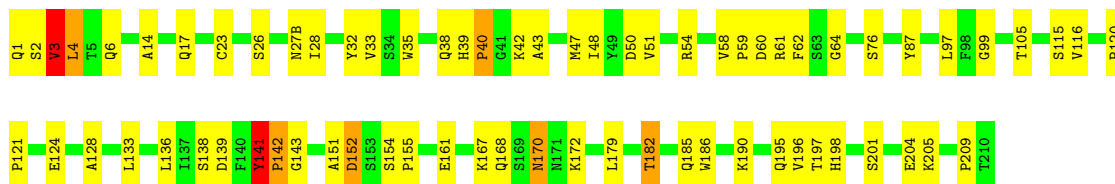
3 Residue-property plots

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.

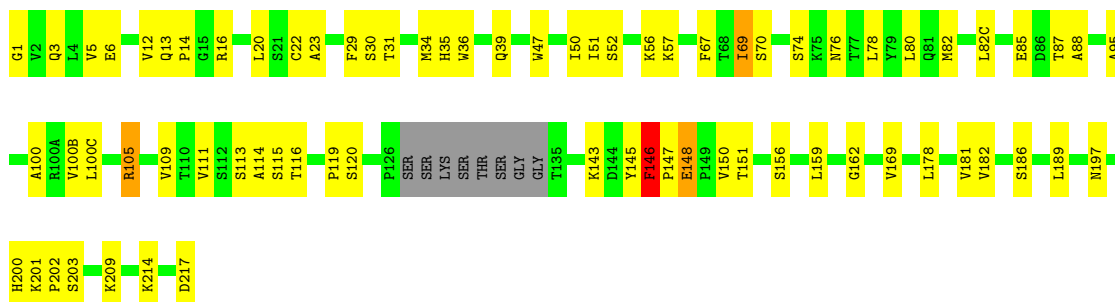
- Molecule 1: anti-factor IX antibody, 10C12, chain L

Chain L: 



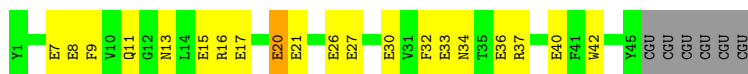
- Molecule 2: anti-factor IX antibody, 10C12, chain H

Chain H: 



- Molecule 3: factor IX

Chain G: 



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	105.09Å 71.61Å 90.87Å 90.00° 119.14° 90.00°	Depositor
Resolution (Å)	24.66 – 2.20	Depositor
% Data completeness (in resolution range)	88.1 (24.66-2.20)	Depositor
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.233 , 0.270	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	3799	wwPDB-VP
Average B, all atoms (Å ²)	40.0	wwPDB-VP

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: CA, CGU, 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	L	0.43	0/1632	1.06	10/2226 (0.4%)
2	H	0.39	0/1661	1.01	11/2258 (0.5%)
3	G	0.31	0/278	0.72	0/356
All	All	0.40	0/3571	1.02	21/4840 (0.4%)

There are no bond length outliers.

The worst 5 of 21 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	148	GLU	CA-C-N	-12.50	104.22	119.84
2	H	148	GLU	C-N-CA	-12.50	104.22	119.84
1	L	141	TYR	CA-C-N	-9.57	107.88	119.84
1	L	141	TYR	C-N-CA	-9.57	107.88	119.84
2	H	146	PHE	CA-C-N	-7.65	112.10	119.90

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	L	1592	0	1541	73	0
2	H	1624	0	1609	69	0
3	G	424	0	313	10	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	L	5	0	0	0	0
5	G	6	0	0	0	0
6	G	14	0	0	0	0
6	H	50	0	0	1	0
6	L	84	0	0	1	0
All	All	3799	0	3463	140	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 20.

The worst 5 of 140 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:L:136:LEU:HD13	2:H:181:VAL:HG11	1.38	1.05
1:L:27(B):ASN:HD22	1:L:28:ILE:H	1.08	1.01
1:L:14:ALA:H	1:L:17:GLN:HE21	1.04	0.99
2:H:156:SER:H	2:H:197:ASN:HD21	1.08	0.99
2:H:146:PHE:HB3	2:H:147:PRO:HD3	1.55	0.89

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	L	211/213 (99%)	200 (95%)	6 (3%)	5 (2%)	4	3
2	H	212/224 (95%)	200 (94%)	11 (5%)	1 (0%)	24	27
3	G	31/51 (61%)	29 (94%)	2 (6%)	0	100	100
All	All	454/488 (93%)	429 (94%)	19 (4%)	6 (1%)	9	8

5 of 6 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	L	3	VAL
2	H	146	PHE
1	L	4	LEU
1	L	141	TYR
1	L	152	ASP

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	L	181/181 (100%)	176 (97%)	5 (3%)	38	52
2	H	179/185 (97%)	174 (97%)	5 (3%)	38	52
3	G	30/30 (100%)	29 (97%)	1 (3%)	33	45
All	All	390/396 (98%)	379 (97%)	11 (3%)	38	52

5 of 11 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	H	150	VAL
2	H	151	THR
3	G	42	TRP
2	H	159	LEU
1	L	170	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 21 such sidechains are listed below:

Mol	Chain	Res	Type
2	H	82(A)	ASN
2	H	199	ASN
3	G	34	ASN
2	H	200	HIS
2	H	197	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

12 non-standard protein/DNA/RNA residues are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	CGU	G	30	3,5	9,11,12	1.00	0	10,14,16	1.38	2 (20%)
3	CGU	G	21	3,5	9,11,12	1.05	0	10,14,16	1.50	3 (30%)
3	CGU	G	26	3,5	9,11,12	1.06	0	10,14,16	1.42	2 (20%)
3	CGU	G	33	3	9,11,12	1.01	0	10,14,16	1.31	2 (20%)
3	CGU	G	8	3,5	9,11,12	1.02	0	10,14,16	1.36	2 (20%)
3	CGU	G	17	3,5	9,11,12	1.04	0	10,14,16	1.53	3 (30%)
3	CGU	G	27	3,5	9,11,12	1.09	0	10,14,16	1.41	2 (20%)
3	CGU	G	40	3	9,11,12	1.05	0	10,14,16	1.29	2 (20%)
3	CGU	G	15	3,5	9,11,12	1.00	0	10,14,16	1.35	2 (20%)
3	CGU	G	36	3	9,11,12	1.11	0	10,14,16	1.28	2 (20%)
3	CGU	G	20	3,5	9,11,12	1.00	0	10,14,16	1.32	2 (20%)
3	CGU	G	7	3,5	9,11,12	1.10	0	10,14,16	1.32	2 (20%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	CGU	G	30	3,5	-	6/13/14/16	-
3	CGU	G	21	3,5	-	1/13/14/16	-
3	CGU	G	26	3,5	-	3/13/14/16	-
3	CGU	G	33	3	-	2/13/14/16	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	CGU	G	8	3,5	-	6/13/14/16	-
3	CGU	G	17	3,5	-	6/13/14/16	-
3	CGU	G	27	3,5	-	5/13/14/16	-
3	CGU	G	40	3	-	5/13/14/16	-
3	CGU	G	15	3,5	-	1/13/14/16	-
3	CGU	G	36	3	-	2/13/14/16	-
3	CGU	G	20	3,5	-	4/13/14/16	-
3	CGU	G	7	3,5	-	1/13/14/16	-

There are no bond length outliers.

The worst 5 of 26 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	G	27	CGU	CB-CG-CD1	3.49	120.19	113.11
3	G	7	CGU	CB-CG-CD2	3.46	120.13	113.11
3	G	26	CGU	CB-CG-CD2	3.42	120.05	113.11
3	G	17	CGU	CB-CG-CD2	3.42	120.05	113.11
3	G	8	CGU	CB-CG-CD2	3.03	119.26	113.11

There are no chirality outliers.

5 of 42 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	G	7	CGU	CA-CB-CG-CD1
3	G	8	CGU	O-C-CA-CB
3	G	8	CGU	N-CA-CB-CG
3	G	8	CGU	CA-CB-CG-CD2
3	G	15	CGU	CA-CB-CG-CD1

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	G	20	CGU	1	0

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 7 ligands modelled in this entry, 6 are monoatomic - leaving 1 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
4	SO4	L	211	-	4,4,4	1.79	2 (50%)	6,6,6	0.82	0

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	L	211	SO4	O1-S	2.85	1.61	1.44
4	L	211	SO4	O3-S	-2.09	1.31	1.48

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.