



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 17, 2021 – 04:00 AM EDT

PDB ID : 1N29
Title : Crystal structure of the N1A mutant of human group IIA phospholipase A2
Authors : Edwards, S.H.; Thompson, D.; Baker, S.F.; Wood, S.P.; Wilton, D.C.
Deposited on : 2002-10-22
Resolution : 2.60 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 following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Xtrriage (Phenix) : **NOT EXECUTED**
EDS : **NOT EXECUTED**
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.23.2

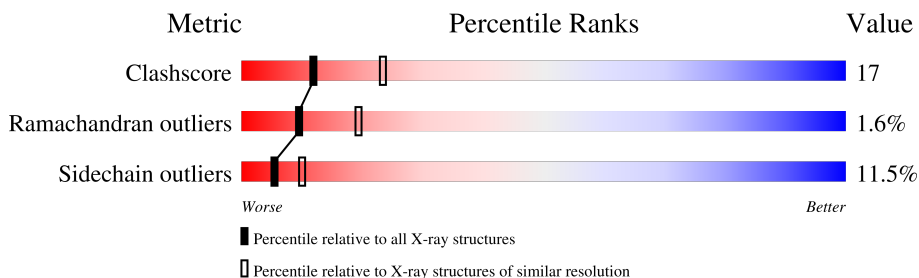
1 Overall quality at a glance

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	141614	3518 (2.60-2.60)
Ramachandran outliers	138981	3455 (2.60-2.60)
Sidechain outliers	138945	3455 (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	A	124	

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 990 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 Phospholipase A2, membrane associated.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	124	963	588	183	177	15	71	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	ALA	ASN	engineered mutation	UNP P14555

- Molecule 2 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	2	Total	Ca	0	0
			2	2		

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	25	Total	O	0	0
			25	25		

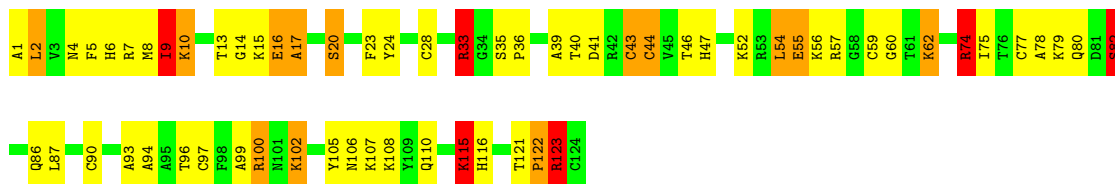
3 Residue-property plots [i](#)

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: Phospholipase A2, membrane associated

Chain A: 



4 Data and refinement statistics

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

Property	Value	Source
Space group	P 61 2 2	Depositor
Cell constants a, b, c, α , β , γ	74.79Å 74.79Å 88.89Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	15.00 – 2.60	Depositor
% Data completeness (in resolution range)	(Not available) (15.00-2.60)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	CNS	Depositor
R, R_{free}	0.242 , 0.320	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	990	wwPDB-VP
Average B, all atoms (Å ²)	37.0	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

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	1.96	25/981 (2.5%)	2.93	69/1308 (5.3%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	6

All (25) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	79	LYS	CB-CG	25.45	2.21	1.52
1	A	10	LYS	CB-CG	-17.25	1.05	1.52
1	A	16	GLU	C-N	15.67	1.70	1.34
1	A	59	CYS	CA-C	-15.09	1.13	1.52
1	A	107	LYS	CB-CG	-12.79	1.18	1.52
1	A	33	ARG	CB-CG	-11.61	1.21	1.52
1	A	43	CYS	C-N	11.53	1.60	1.34
1	A	56	LYS	CB-CG	-10.81	1.23	1.52
1	A	17	ALA	C-N	9.40	1.55	1.34
1	A	17	ALA	CA-C	-8.67	1.30	1.52
1	A	55	GLU	N-CA	-8.49	1.29	1.46
1	A	2	LEU	C-O	-8.37	1.07	1.23
1	A	59	CYS	N-CA	7.26	1.60	1.46
1	A	16	GLU	N-CA	-6.88	1.32	1.46
1	A	77	CYS	CB-SG	-6.73	1.70	1.82
1	A	60	GLY	N-CA	-6.72	1.35	1.46
1	A	57	ARG	NE-CZ	-6.58	1.24	1.33
1	A	9	ILE	CA-CB	-6.34	1.40	1.54

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	55	GLU	CA-C	-5.92	1.37	1.52
1	A	123	ARG	CA-CB	5.70	1.66	1.53
1	A	52	LYS	CB-CG	5.61	1.67	1.52
1	A	60	GLY	CA-C	-5.60	1.42	1.51
1	A	16	GLU	CA-C	-5.54	1.38	1.52
1	A	121	THR	CA-C	-5.38	1.39	1.52
1	A	110	GLN	CD-OE1	5.13	1.35	1.24

All (69) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	74	ARG	NE-CZ-NH2	-34.28	103.16	120.30
1	A	33	ARG	NE-CZ-NH2	-33.39	103.60	120.30
1	A	33	ARG	NE-CZ-NH1	31.37	135.99	120.30
1	A	74	ARG	NE-CZ-NH1	28.52	134.56	120.30
1	A	10	LYS	CA-CB-CG	18.35	153.76	113.40
1	A	33	ARG	CA-CB-CG	17.90	152.78	113.40
1	A	107	LYS	CA-CB-CG	17.31	151.48	113.40
1	A	82	SER	O-C-N	-15.88	97.29	122.70
1	A	79	LYS	N-CA-CB	-15.38	82.91	110.60
1	A	55	GLU	O-C-N	-14.51	99.49	122.70
1	A	33	ARG	CB-CA-C	-14.09	82.23	110.40
1	A	10	LYS	N-CA-CB	13.66	135.19	110.60
1	A	33	ARG	CB-CG-CD	12.14	143.15	111.60
1	A	10	LYS	CB-CG-CD	11.79	142.26	111.60
1	A	17	ALA	O-C-N	-11.13	104.89	122.70
1	A	33	ARG	N-CA-CB	10.61	129.70	110.60
1	A	110	GLN	CG-CD-OE1	-10.55	100.51	121.60
1	A	79	LYS	CA-CB-CG	-10.46	90.38	113.40
1	A	107	LYS	CB-CG-CD	10.22	138.16	111.60
1	A	23	PHE	O-C-N	10.15	138.93	122.70
1	A	10	LYS	CB-CA-C	-10.06	90.28	110.40
1	A	82	SER	CA-C-N	9.93	139.04	117.20
1	A	55	GLU	CA-C-N	9.90	138.99	117.20
1	A	100	ARG	CD-NE-CZ	-9.83	109.83	123.60
1	A	59	CYS	O-C-N	-9.34	107.32	123.20
1	A	74	ARG	CG-CD-NE	-9.02	92.86	111.80
1	A	107	LYS	CB-CA-C	-9.01	92.39	110.40
1	A	100	ARG	NE-CZ-NH1	-8.98	115.81	120.30
1	A	33	ARG	CD-NE-CZ	-8.73	111.38	123.60
1	A	107	LYS	N-CA-CB	8.65	126.17	110.60
1	A	56	LYS	N-CA-CB	8.49	125.89	110.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	110	GLN	CG-CD-NE2	8.12	136.19	116.70
1	A	59	CYS	C-N-CA	8.06	139.22	122.30
1	A	56	LYS	CD-CE-NZ	-7.92	93.47	111.70
1	A	79	LYS	CD-CE-NZ	-7.86	93.63	111.70
1	A	55	GLU	C-N-CA	7.79	141.17	121.70
1	A	82	SER	C-N-CA	7.77	141.13	121.70
1	A	115	LYS	CD-CE-NZ	-7.76	93.86	111.70
1	A	102	LYS	CD-CE-NZ	-7.71	93.98	111.70
1	A	100	ARG	CG-CD-NE	7.58	127.72	111.80
1	A	17	ALA	CA-C-N	7.02	132.64	117.20
1	A	10	LYS	CD-CE-NZ	-7.00	95.59	111.70
1	A	59	CYS	CA-C-N	6.93	130.06	116.20
1	A	59	CYS	N-CA-C	6.88	129.56	111.00
1	A	116	HIS	O-C-N	-6.87	111.70	122.70
1	A	110	GLN	CA-CB-CG	6.80	128.35	113.40
1	A	100	ARG	CA-CB-CG	6.61	127.95	113.40
1	A	52	LYS	CB-CG-CD	-6.51	94.67	111.60
1	A	106	ASN	CA-C-N	-6.49	102.92	117.20
1	A	57	ARG	CD-NE-CZ	-6.44	114.59	123.60
1	A	115	LYS	CA-CB-CG	6.43	127.56	113.40
1	A	74	ARG	CA-CB-CG	6.29	127.24	113.40
1	A	106	ASN	O-C-N	6.22	132.65	122.70
1	A	14	GLY	O-C-N	-6.19	112.79	122.70
1	A	52	LYS	CD-CE-NZ	6.16	125.86	111.70
1	A	62	LYS	CA-CB-CG	5.97	126.53	113.40
1	A	13	THR	O-C-N	5.97	133.34	123.20
1	A	100	ARG	CB-CG-CD	-5.81	96.50	111.60
1	A	14	GLY	C-N-CA	5.70	135.96	121.70
1	A	56	LYS	CG-CD-CE	5.66	128.88	111.90
1	A	23	PHE	CA-C-O	-5.64	108.25	120.10
1	A	102	LYS	CB-CG-CD	-5.59	97.07	111.60
1	A	115	LYS	CG-CD-CE	-5.58	95.17	111.90
1	A	102	LYS	CG-CD-CE	5.47	128.31	111.90
1	A	122	PRO	O-C-N	-5.39	114.08	122.70
1	A	52	LYS	CG-CD-CE	5.25	127.64	111.90
1	A	79	LYS	CB-CG-CD	5.20	125.13	111.60
1	A	107	LYS	CD-CE-NZ	5.09	123.41	111.70
1	A	110	GLN	CB-CG-CD	5.01	124.63	111.60

There are no chirality outliers.

All (6) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	100	ARG	Sidechain
1	A	105	TYR	Mainchain
1	A	33	ARG	Sidechain
1	A	55	GLU	Mainchain
1	A	74	ARG	Sidechain
1	A	82	SER	Mainchain

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	963	0	924	30	0
2	A	2	0	0	0	0
3	A	25	0	0	2	0
All	All	990	0	924	30	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.

All (30) 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:16:GLU:C	1:A:17:ALA:N	1.70	1.42
1:A:16:GLU:O	1:A:20:SER:HB2	1.87	0.74
1:A:15:LYS:HD3	1:A:20:SER:OG	1.88	0.73
1:A:16:GLU:C	1:A:17:ALA:CA	2.65	0.62
1:A:40:THR:O	1:A:43:CYS:HB2	1.99	0.62
1:A:16:GLU:CA	1:A:17:ALA:N	2.61	0.58
1:A:94:ALA:O	1:A:97:CYS:HB3	2.05	0.55
1:A:44:CYS:HA	1:A:47:HIS:CB	2.38	0.53
1:A:54:LEU:HD11	1:A:86:GLN:HB2	1.90	0.53
1:A:36:PRO:HA	1:A:41:ASP:OD2	2.10	0.52
1:A:35:SER:HB2	3:A:148:HOH:O	2.11	0.50
1:A:87:LEU:O	1:A:90:CYS:HB2	2.11	0.50
1:A:1:ALA:O	1:A:4:ASN:HB2	2.12	0.49
1:A:82:SER:O	1:A:86:GLN:HG3	2.12	0.49
1:A:24:TYR:O	1:A:28:CYS:HB2	2.13	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:5:PHE:O	1:A:9:ILE:HG12	2.13	0.47
1:A:44:CYS:HA	1:A:47:HIS:HB3	1.97	0.46
1:A:2:LEU:O	1:A:5:PHE:HB3	2.15	0.45
1:A:44:CYS:HA	1:A:47:HIS:HB2	1.98	0.45
1:A:2:LEU:CD2	1:A:62:LYS:HG2	2.47	0.44
1:A:54:LEU:HD13	1:A:54:LEU:HA	1.73	0.43
1:A:93:ALA:O	1:A:97:CYS:HB2	2.19	0.42
1:A:4:ASN:O	1:A:7:ARG:HB2	2.19	0.42
1:A:78:ALA:O	1:A:80:GLN:HG2	2.20	0.42
1:A:6:HIS:HA	1:A:9:ILE:HG13	2.02	0.42
1:A:24:TYR:CE2	1:A:40:THR:HB	2.55	0.41
1:A:39:ALA:HB3	3:A:141:HOH:O	2.21	0.41
1:A:96:THR:O	1:A:99:ALA:HB3	2.20	0.41
1:A:115:LYS:HZ3	1:A:115:LYS:HG3	1.04	0.41
1:A:8:MET:HG2	1:A:75:ILE:HD13	2.02	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	122/124 (98%)	113 (93%)	7 (6%)	2 (2%)	9 19

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	123	ARG
1	A	122	PRO

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	A	104/104 (100%)	92 (88%)	12 (12%)	5 10

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	9	ILE
1	A	10	LYS
1	A	20	SER
1	A	33	ARG
1	A	44	CYS
1	A	46	THR
1	A	54	LEU
1	A	74	ARG
1	A	102	LYS
1	A	108	LYS
1	A	115	LYS
1	A	123	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	27	HIS

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 monosaccharides 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](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	A	2

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	A	16:GLU	C	17:ALA	N	1.70
1	A	43:CYS	C	44:CYS	N	1.60

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.