



Full wwPDB NMR Structure Validation Report ⓘ

Mar 10, 2026 – 01:01 AM UTC

PDB ID : 1PIR / pdb_00001pir
Title : SOLUTION STRUCTURE OF PORCINE PANCREATIC PHOSPHOLIPASE A2
Authors : Van Den Berg, B.D.; Tessari, M.; De Haas, G.H.; Verheij, H.M.; Boelens, R.; Kaptein, R.
Deposited on : 1994-12-22

This is a Full wwPDB NMR Structure Validation Report for a publicly released PDB entry.

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A user guide is available at

<https://www.wwpdb.org/validation/2017/NMRValidationReportHelp>

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
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
wwPDB-RCI	:	v_1n_11_5_13_A (Berjanski et al., 2005)
PANAV	:	Wang et al. (2010)
wwPDB-ShiftChecker	:	v1.2
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

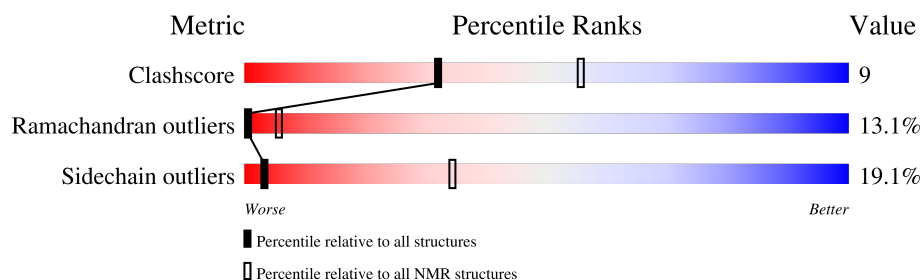
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

SOLUTION NMR

The overall completeness of chemical shifts assignment was not calculated.

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)	NMR archive (#Entries)
Clashscore	229148	14424
Ramachandran outliers	224038	12848
Sidechain outliers	223484	12823

The table below summarises the geometric issues observed across the polymeric chains and their fit to the experimental data. The red, orange, yellow and green segments indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. A cyan segment indicates the fraction of residues that are not part of the well-defined cores, and 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 $\leq 5\%$

Mol	Chain	Length	Quality of chain
1	A	124	31% 39% 20% 10%

2 Ensemble composition and analysis ⓘ

This entry contains 1 models. Identification of well-defined residues and clustering analysis are not possible.

3 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 972 atoms, of which 0 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called PHOSPHOLIPASE A2.

Mol	Chain	Residues	Atoms					Trace
1	A	124	Total	C	N	O	S	0
			971	596	166	193	16	

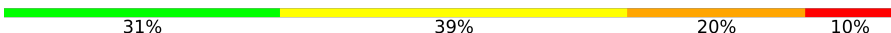
- Molecule 2 is CALCIUM ION (CCD ID: CA) (formula: Ca).

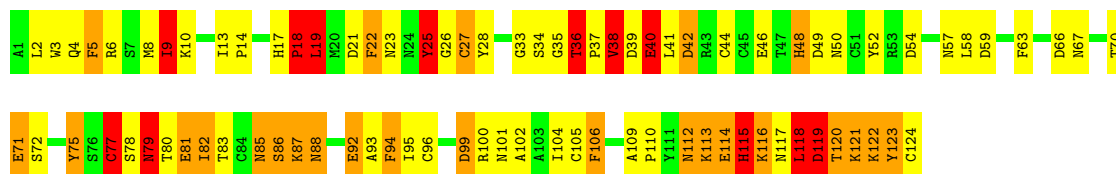
Mol	Chain	Residues	Atoms	
2	A	1	Total	Ca
			1	1

4 Residue-property plots

These plots are provided for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic is the same as shown in the summary in section 1 of this report. The second graphic shows the sequence where residues are colour-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 outliers are shown as green connectors. Residues which are classified as ill-defined in the NMR ensemble, are shown in cyan with an underline colour-coded according to the previous scheme. Residues which were present in the experimental sample, but not modelled in the final structure are shown in grey.

• Molecule 1: PHOSPHOLIPASE A2

Chain A: 



5 Refinement protocol and experimental data overview ⓘ

Of the ? calculated structures, 1 were deposited, based on the following criterion: ?.

The authors did not provide any information on software used for structure solution, optimization or refinement.

No chemical shift data was provided.

6 Model quality [i](#)

6.1 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 (average) 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	1.85	19/993 (1.9%)	2.42	60/1340 (4.5%)
All	All	1.85	19/993 (1.9%)	2.42	60/1340 (4.5%)

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	Planarity
1	A	0	26
All	All	0	26

All bond outliers are listed below. They are sorted according to the Z-score.

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	124	CYS	C-OXT	7.06	1.37	1.23
1	A	114	GLU	CD-OE2	6.48	1.37	1.25
1	A	59	ASP	CG-OD2	6.47	1.37	1.25
1	A	119	ASP	CG-OD2	6.47	1.37	1.25
1	A	21	ASP	CG-OD2	6.46	1.37	1.25
1	A	40	GLU	CD-OE1	6.46	1.37	1.25
1	A	71	GLU	CD-OE1	6.45	1.37	1.25
1	A	92	GLU	CD-OE2	6.44	1.37	1.25
1	A	66	ASP	CG-OD2	6.44	1.37	1.25
1	A	81	GLU	CD-OE1	6.43	1.37	1.25
1	A	54	ASP	CG-OD2	6.42	1.37	1.25
1	A	39	ASP	CG-OD2	6.40	1.37	1.25
1	A	46	GLU	CD-OE1	6.39	1.37	1.25
1	A	49	ASP	CG-OD2	6.35	1.37	1.25
1	A	99	ASP	CG-OD2	6.31	1.37	1.25
1	A	42	ASP	CG-OD1	6.08	1.36	1.25

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	17	HIS	ND1-CE1	5.27	1.37	1.32
1	A	48	HIS	ND1-CE1	5.25	1.37	1.32
1	A	5	PHE	CA-C	5.24	1.59	1.52

All angle outliers are listed below. They are sorted according to the Z-score.

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	115	HIS	ND1-CE1-NE2	13.83	122.23	108.40
1	A	115	HIS	CE1-NE2-CD2	-12.69	96.31	109.00
1	A	17	HIS	ND1-CE1-NE2	11.92	120.32	108.40
1	A	48	HIS	ND1-CE1-NE2	11.83	120.23	108.40
1	A	119	ASP	N-CA-CB	-11.81	92.60	110.20
1	A	22	PHE	CA-CB-CG	10.66	124.46	113.80
1	A	115	HIS	CB-CG-CD2	-9.57	118.75	131.20
1	A	17	HIS	CE1-NE2-CD2	-9.15	99.85	109.00
1	A	48	HIS	CE1-NE2-CD2	-9.03	99.97	109.00
1	A	106	PHE	CA-CB-CG	8.73	122.53	113.80
1	A	118	LEU	CA-C-N	7.92	134.12	120.58
1	A	118	LEU	C-N-CA	7.92	134.12	120.58
1	A	123	TYR	CB-CA-C	7.88	124.40	110.37
1	A	49	ASP	CA-CB-CG	7.82	120.42	112.60
1	A	112	ASN	CA-CB-CG	7.78	120.38	112.60
1	A	25	TYR	CA-CB-CG	7.45	127.32	113.90
1	A	48	HIS	CA-CB-CG	7.33	121.12	113.80
1	A	77	CYS	O-C-N	-7.28	112.90	122.59
1	A	9	ILE	CA-CB-CG1	7.18	122.61	110.40
1	A	3	TRP	CB-CG-CD2	7.06	136.69	126.80
1	A	3	TRP	CB-CG-CD1	-7.03	116.36	126.90
1	A	83	THR	CB-CA-C	6.96	124.27	110.42
1	A	80	THR	N-CA-C	6.91	118.70	111.03
1	A	88	ASN	CA-CB-CG	6.91	119.51	112.60
1	A	88	ASN	N-CA-CB	-6.75	99.09	110.49
1	A	52	TYR	CB-CG-CD2	-6.54	110.99	120.80
1	A	18	PRO	N-CA-C	6.53	125.92	112.47
1	A	115	HIS	CG-ND1-CE1	-6.53	98.21	109.30
1	A	83	THR	CA-CB-CG2	6.44	121.44	110.50
1	A	48	HIS	CG-ND1-CE1	-6.27	98.64	109.30
1	A	17	HIS	CG-ND1-CE1	-6.19	98.77	109.30
1	A	48	HIS	CB-CG-CD2	-6.08	123.29	131.20
1	A	85	ASN	CA-CB-CG	6.07	118.67	112.60
1	A	116	LYS	CB-CA-C	6.03	122.92	110.31
1	A	86	SER	N-CA-CB	-6.00	101.08	110.44

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	52	TYR	CB-CG-CD1	5.88	129.62	120.80
1	A	112	ASN	N-CA-CB	5.83	119.03	110.35
1	A	118	LEU	CA-C-O	5.81	128.62	121.94
1	A	93	ALA	N-CA-C	5.80	117.28	111.07
1	A	13	ILE	CB-CA-C	5.77	121.86	111.36
1	A	50	ASN	CA-CB-CG	5.69	118.29	112.60
1	A	59	ASP	N-CA-C	5.58	118.12	111.71
1	A	21	ASP	CA-CB-CG	5.56	118.16	112.60
1	A	38	VAL	CB-CA-C	5.45	120.23	111.29
1	A	82	ILE	CA-CB-CG2	5.36	119.61	110.50
1	A	27	CYS	N-CA-C	5.27	118.87	112.23
1	A	115	HIS	CG-CD2-NE2	5.25	112.45	107.20
1	A	67	ASN	CA-CB-CG	5.24	117.83	112.60
1	A	17	HIS	CB-CG-CD2	-5.17	124.48	131.20
1	A	10	LYS	CB-CG-CD	5.12	123.08	111.30
1	A	81	GLU	N-CA-C	5.10	121.67	110.80
1	A	87	LYS	CA-C-N	5.09	131.27	121.54
1	A	87	LYS	C-N-CA	5.09	131.27	121.54
1	A	95	ILE	CA-CB-CG1	5.09	119.05	110.40
1	A	25	TYR	N-CA-C	5.06	117.21	110.53
1	A	119	ASP	CA-CB-CG	5.06	117.66	112.60
1	A	38	VAL	CA-CB-CG1	5.05	118.99	110.40
1	A	48	HIS	ND1-CG-CD2	5.04	111.14	106.10
1	A	77	CYS	CB-CA-C	5.04	120.45	110.42
1	A	23	ASN	N-CA-C	5.01	117.47	111.71

There are no chirality outliers.

All planar outliers are listed below.

Mol	Chain	Res	Type	Group
1	A	4	GLN	Peptide
1	A	25	TYR	Sidechain
1	A	28	TYR	Sidechain
1	A	33	GLY	Peptide
1	A	34	SER	Peptide
1	A	35	GLY	Peptide
1	A	38	VAL	Peptide
1	A	41	LEU	Peptide
1	A	57	ASN	Peptide
1	A	63	PHE	Peptide
1	A	71	GLU	Peptide
1	A	75	TYR	Sidechain

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Mol	Chain	Res	Type	Group
1	A	77	CYS	Peptide
1	A	79	ASN	Peptide
1	A	85	ASN	Peptide
1	A	86	SER	Peptide
1	A	94	PHE	Sidechain
1	A	101	ASN	Peptide
1	A	109	ALA	Peptide
1	A	113	LYS	Peptide
1	A	115	HIS	Sidechain
1	A	116	LYS	Peptide
1	A	117	ASN	Peptide
1	A	119	ASP	Peptide
1	A	120	THR	Peptide
1	A	123	TYR	Sidechain

6.2 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 each 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 averaged over the ensemble.

Mol	Chain	Non-H	H(model)	H(added)	Clashes
1	A	971	0	886	16
All	All	972	0	886	16

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 9.

All clashes are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Clash(Å)	Distance(Å)
1:A:118:LEU:HD12	1:A:119:ASP:HB2	0.71	1.59
1:A:27:CYS:SG	1:A:36:THR:O	0.54	2.65
1:A:18:PRO:HA	1:A:22:PHE:CD2	0.54	2.37
1:A:119:ASP:HB3	1:A:122:LYS:CE	0.52	2.34
1:A:44:CYS:SG	1:A:105:CYS:O	0.51	2.68
1:A:58:LEU:HD13	1:A:94:PHE:CE2	0.47	2.43
1:A:5:PHE:CZ	1:A:9:ILE:HD11	0.47	2.45
1:A:100:ARG:O	1:A:104:ILE:HD12	0.46	2.09
1:A:8:MET:HE3	1:A:75:TYR:CB	0.45	2.42
1:A:6:ARG:CG	1:A:19:LEU:HD21	0.45	2.42

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Atom-1	Atom-2	Clash(Å)	Distance(Å)
1:A:26:GLY:HA2	1:A:38:VAL:HG21	0.44	1.89
1:A:92:GLU:O	1:A:96:CYS:SG	0.44	2.75
1:A:19:LEU:HD13	1:A:19:LEU:H	0.43	1.73
1:A:6:ARG:HG3	1:A:19:LEU:HD21	0.43	1.90
1:A:121:LYS:CE	1:A:122:LYS:HD2	0.41	2.45
1:A:8:MET:HE2	1:A:82:ILE:CG2	0.40	2.46

6.3 Torsion angles [i](#)

6.3.1 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 PDB entries followed by that with respect to all NMR entries. 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%)	83 (68%)	23 (19%)	16 (13%)	0	6
All	All	122/124 (98%)	83 (68%)	23 (19%)	16 (13%)	0	6

All 16 Ramachandran outliers are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type
1	A	14	PRO
1	A	18	PRO
1	A	19	LEU
1	A	36	THR
1	A	37	PRO
1	A	38	VAL
1	A	40	GLU
1	A	72	SER
1	A	78	SER
1	A	79	ASN
1	A	81	GLU
1	A	87	LYS
1	A	88	ASN
1	A	102	ALA
1	A	110	PRO
1	A	120	THR

6.3.2 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 PDB entries followed by that with respect to all NMR entries. 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	110/110 (100%)	89 (81%)	21 (19%)	3 34
All	All	110/110 (100%)	89 (81%)	21 (19%)	3 34

All 21 residues with a non-rotameric sidechain are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type
1	A	2	LEU
1	A	9	ILE
1	A	18	PRO
1	A	19	LEU
1	A	25	TYR
1	A	36	THR
1	A	40	GLU
1	A	42	ASP
1	A	48	HIS
1	A	70	THR
1	A	77	CYS
1	A	79	ASN
1	A	99	ASP
1	A	106	PHE
1	A	112	ASN
1	A	113	LYS
1	A	114	GLU
1	A	115	HIS
1	A	118	LEU
1	A	121	LYS
1	A	122	LYS

6.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

There are no non-standard protein/DNA/RNA residues in this entry.

6.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.6 Ligand geometry [i](#)

Of 1 ligands modelled in this entry, 1 is monoatomic - leaving 0 for Mogul analysis.

6.7 Other polymers [i](#)

There are no such molecules in this entry.

6.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

7 Chemical shift validation

No chemical shift data were provided