



Full wwPDB NMR Structure Validation Report ⓘ

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PDB ID : 1K9H / pdb_00001k9h
Title : NMR structure of DNA TGTGAGCGCTCACA
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Deposited on : 2001-10-29

This is a Full wwPDB NMR 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/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

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 is only 1 type of molecule in this entry. The entry contains 886 atoms, of which 318 are hydrogens and 0 are deuteriums.

- Molecule 1 is a DNA chain called 5'-D(*TP*GP*TP*GP*AP*GP*CP*GP*CP*TP*CP*AP*CP*A)-3'.

Mol	Chain	Residues	Atoms					Trace	
			Total	C	H	N	O		P
1	A	14	Total 443	136	159	53	82	13	0
1	B	14	Total 443	136	159	53	82	13	0

4 Residue-property plots [i](#)

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.

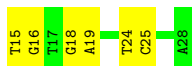
- Molecule 1: 5'-D(*TP*GP*TP*GP*AP*GP*CP*GP*CP*TP*CP*AP*CP*A)-3'

Chain A:  50% 36% 14%



- Molecule 1: 5'-D(*TP*GP*TP*GP*AP*GP*CP*GP*CP*TP*CP*AP*CP*A)-3'

Chain B:  57% 43%



5 Refinement protocol and experimental data overview

The models were refined using the following method: *molecular dynamics, matrix relaxation, simulated annealing.*

Of the 2 calculated structures, 1 were deposited, based on the following criterion: *back calculated data agree with experimental NOESY spectrum, structures with the lowest energy.*

The following table shows the software used for structure solution, optimisation and refinement.

Software name	Classification	Version
Amber	refinement	versions 3-5
MORASS	refinement	1.0

No chemical shift data was provided.

6 Model quality i

6.1 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 (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	1.65	3/318 (0.9%)	1.42	6/489 (1.2%)
1	B	1.32	0/318 (0.0%)	1.15	1/489 (0.2%)
All	All	1.49	3/636 (0.5%)	1.30	7/978 (0.7%)

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	4
1	B	0	5
All	All	0	9

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	1	DT	O5'-C5'	-12.53	1.05	1.42
1	A	9	DC	P-O5'	-6.58	1.47	1.60
1	A	9	DC	P-OP1	-6.36	1.35	1.48

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

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	9	DC	P-O5'-C5'	10.59	135.89	120.00
1	A	1	DT	O5'-C5'-C4'	7.06	121.38	110.80
1	A	12	DA	C4'-C3'-C2'	-6.74	92.30	102.40
1	A	4	DG	C4'-C3'-O3'	5.94	118.92	110.00
1	B	24	DT	C3'-C2'-C1'	5.93	110.49	101.60
1	A	10	DT	C3'-C2'-C1'	5.89	110.43	101.60
1	A	4	DG	O4'-C1'-N9	5.41	116.52	108.40

There are no chirality outliers.

All planar outliers are listed below.

Mol	Chain	Res	Type	Group
1	A	4	DG	Sidechain
1	A	5	DA	Sidechain
1	A	7	DC	Sidechain
1	A	12	DA	Sidechain
1	B	15	DT	Sidechain
1	B	16	DG	Sidechain
1	B	18	DG	Sidechain
1	B	19	DA	Sidechain
1	B	25	DC	Sidechain

6.2 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 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
All	All	568	318	318	-

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 -.

There are no clashes.

6.3 Torsion angles [i](#)

6.3.1 Protein backbone [i](#)

There are no protein molecules in this entry.

6.3.2 Protein sidechains [i](#)

There are no protein molecules in this entry.

6.3.3 RNA [i](#)

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](#)

There are no ligands in this entry.

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