wwPDB X-ray Structure Validation Summary Report (i)

Mar 23, 2024 – 11:24 PM EDT

PDB ID	:	1VKX
Title	:	CRYSTAL STRUCTURE OF THE NFKB P50/P65 HETERODIMER COMPLEXED TO THE IMMUNOGLOBULIN KB DNA
Authors	:	Chen, F.; Huang, D.B.; Ghosh, G.
Deposited on	:	1997-09-17
Resolution	:	2.90 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 (i) 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 (i)) were used in the production of this report:

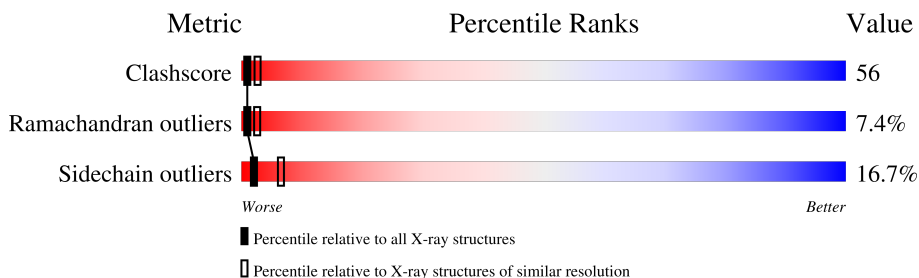|		
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36.1

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 2.90 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	Percentile Ranks	Value
Clashscore		56
Ramachandran outliers		7.4%
Sidechain outliers		16.7%

Worse   *Better*

■ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	141614	2172 (2.90-2.90)
Ramachandran outliers	138981	2115 (2.90-2.90)
Sidechain outliers	138945	2117 (2.90-2.90)

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 <=5%

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	C	12	8% / 67% / 17% / 8%
2	D	12	17% / 83%
3	A	273	30% / 55% / 13% / •
4	B	312	32% / 52% / 14% / •

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 5116 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 DNA chain called DNA (5'-D(*TP*GP*GP*GP*GP*AP*CP*TP*TP*TP*CP*C)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	C	12	Total	C	N	O	P	0	0	0
			243	117	42	73	11			

- Molecule 2 is a DNA chain called DNA (5'-D(*AP*GP*GP*AP*AP*AP*GP*TP*CP*CP*CP*C)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	D	12	Total	C	N	O	P	0	0	0
			243	116	49	67	11			

- Molecule 3 is a protein called PROTEIN (NF-KAPPA B P65 SUBUNIT).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	A	273	Total	C	N	O	S	0	0	0
			2176	1356	401	408	11			

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	19	ALA	PRO	conflict	UNP Q04207

- Molecule 4 is a protein called PROTEIN (NF-KAPPA B P50 SUBUNIT).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	B	312	Total	C	N	O	S	0	0	0
			2454	1554	428	460	12			

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: DNA (5'-D(*TP*GP*GP*GP*GP*AP*CP*TP*TP*TP*CP*C)-3')

Chain C:

- Molecule 2: DNA (5'-D(*AP*GP*GP*AP*AP*AP*GP*TP*CP*CP*CP*C)-3')

Chain D:

- Molecule 3: PROTEIN (NF-KAPPA B P65 SUBUNIT)

Chain A:

- Molecule 4: PROTEIN (NF-KAPPA B P50 SUBUNIT)

Chain B:

4 Data and refinement statistics (i)

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

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α, β, γ	106.61Å 106.61Å 206.56Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	8.00 – 2.90	Depositor
% Data completeness (in resolution range)	(Not available) (8.00-2.90)	Depositor
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	X-PLOR	Depositor
R, R_{free}	0.208 , 0.320	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	5116	wwPDB-VP
Average B, all atoms (Å^2)	27.0	wwPDB-VP

5 Model quality (i)

5.1 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 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	C	0.95	0/271	1.05	3/417 (0.7%)
2	D	0.84	0/273	0.86	0/419
3	A	0.69	0/2228	0.94	4/3021 (0.1%)
4	B	0.66	1/2506 (0.0%)	0.90	1/3384 (0.0%)
All	All	0.70	1/5278 (0.0%)	0.93	8/7241 (0.1%)

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	C	0	3
3	A	0	1
4	B	0	2
All	All	0	6

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	385	CYS	CB-SG	-5.05	1.73	1.81

The worst 5 of 8 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	C	1	DT	C1'-O4'-C4'	-7.32	102.78	110.10
1	C	1	DT	C3'-C2'-C1'	-7.22	93.83	102.50
1	C	1	DT	O4'-C1'-N1	6.69	112.68	108.00
3	A	262	LEU	CA-CB-CG	5.80	128.64	115.30
3	A	135	GLN	N-CA-C	-5.71	95.59	111.00

There are no chirality outliers.

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wwPDB
PROTEIN DATA BANK

5 of 6 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
3	A	227	TYR	Sidechain
4	B	387	TYR	Sidechain
1	C	1	DT	Sidechain
1	C	3	DG	Sidechain
1	C	9	DT	Sidechain

5.2 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 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	C	243	0	138	39	0
2	D	243	0	135	42	0
3	A	2176	0	2137	224	0
4	B	2454	0	2449	276	0
All	All	5116	0	4859	554	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 56.

The worst 5 of 554 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)
4:B:487:THR:HB	4:B:490:GLU:HB2	1.26	1.17
2:D:13:DA:H2"	2:D:14:DG:H5"	1.22	1.16
1:C:2:DG:H2"	1:C:3:DG:C5'	1.82	1.10
4:B:465:PRO:HB2	4:B:467:LEU:HD13	1.32	1.08
1:C:2:DG:H2"	1:C:3:DG:H5'	1.35	1.06

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	
3	A	271/273 (99%)	208 (77%)	44 (16%)	19 (7%)	1	3
4	B	310/312 (99%)	241 (78%)	45 (14%)	24 (8%)	1	2
All	All	581/585 (99%)	449 (77%)	89 (15%)	43 (7%)	1	2

5 of 43 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	A	29	GLN
3	A	40	GLY
3	A	81	PRO
3	A	209	GLY
3	A	231	PRO

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	
3	A	242/242 (100%)	196 (81%)	46 (19%)	1	4
4	B	268/268 (100%)	229 (85%)	39 (15%)	3	9
All	All	510/510 (100%)	425 (83%)	85 (17%)	2	6

5 of 85 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
4	B	460	ILE

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Mol	Chain	Res	Type
4	B	540	SER
4	B	472	ASP
4	B	500	GLN
4	B	568	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 18 such sidechains are listed below:

Mol	Chain	Res	Type
4	B	544	ASN
4	B	620	ASN
4	B	606	GLN
4	B	343	GLN
4	B	500	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

There are no ligands in this entry.

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

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.