wwPDB X-ray Structure Validation Summary Report ⓘ

Dec 2, 2023 – 02:46 pm GMT

PDB ID	:	2C1T
Title	:	Structure of the Kap60p:Nup2 complex
Authors	:	Matsuura, Y.; Stewart, M.
Deposited on	:	2005-09-20
Resolution	:	2.60 Å(reported)

The following versions of software and data (see references ⓘ) were used in the production of this report:

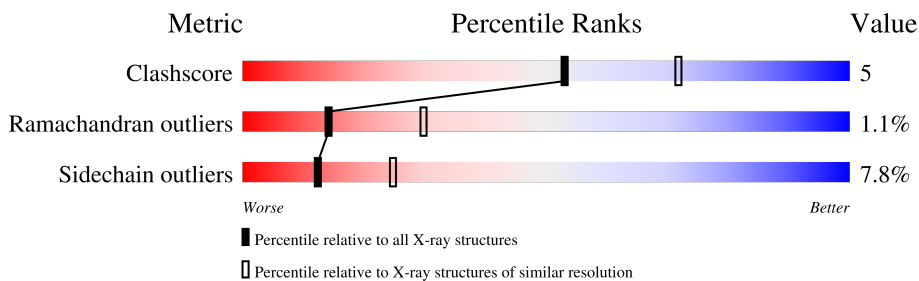|		
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 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	Percentile Ranks	Value
Clashscore		5
Ramachandran outliers		1.1%
Sidechain outliers		7.8%

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	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 <=5%

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	454	77% 15% · 7%
1	B	454	79% 13% · 7%
2	C	51	41% 22% 8% 29%
2	D	51	43% 24% 6% · 24%

2 Entry composition ⓘ

There are 3 unique types of molecules in this entry. The entry contains 7273 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 IMPORTIN ALPHA SUBUNIT.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	423	Total 3274	C 2068	N 555	O 635	S 16	0	0	0
1	B	423	Total 3273	C 2069	N 555	O 633	S 16	0	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	397	ASP	TYR	engineered mutation	UNP Q02821
B	397	ASP	TYR	engineered mutation	UNP Q02821

- Molecule 2 is a protein called NUCLEOPORIN NUP2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	36	Total 278	C 168	N 57	O 51	S 2	0	0	0
2	D	39	Total 297	C 179	N 61	O 55	S 2	0	0	0

- Molecule 3 is water.

| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	41	Total 41	O 41	0	0
3	B	92	Total 92	O 92	0	0
3	C	7	Total 7	O 7	0	0
3	D	11	Total 11	O 11	0	0

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.
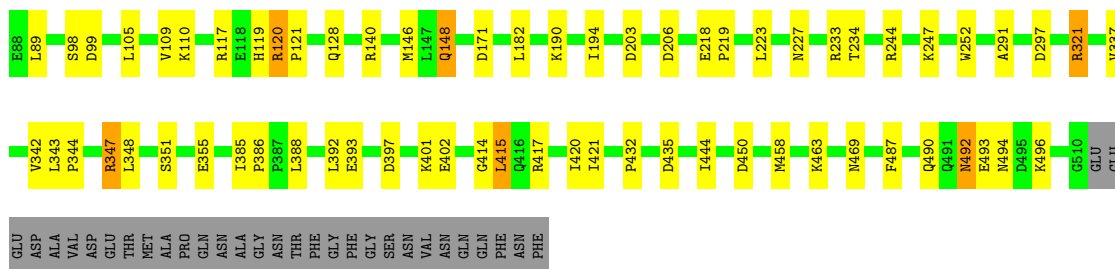
Note EDS was not executed.

• Molecule 1: IMPORTIN ALPHA SUBUNIT

Chain A:
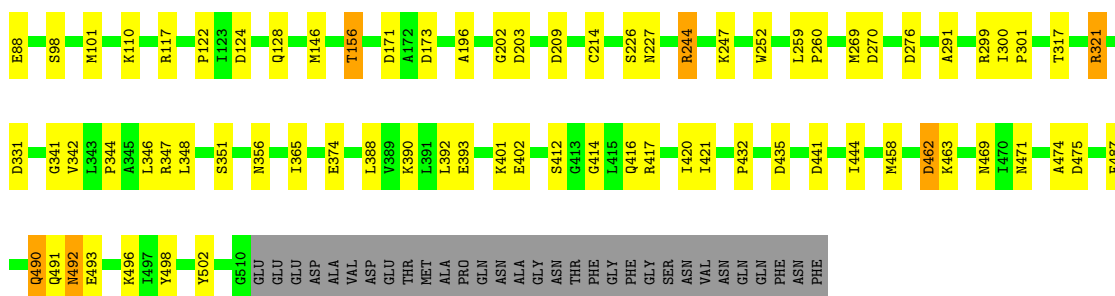
• Molecule 1: IMPORTIN ALPHA SUBUNIT

Chain B:

• Molecule 2: NUCLEOPORIN NUP2

Chain C:

• Molecule 2: NUCLEOPORIN NUP2

Chain D:

MET A2 A8 D16 S17 N18 GLU SER ASP ASP ASP VAL T25 P26 S27 T28 K29 V30 A31 S32 S33 A34 V35 M36 N37 R38 R39 P44 K45 R46 ARG MET ALA PHE LYS

4 Data and refinement statistics ⓘ

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

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α, β, γ	129.81Å 140.08Å 63.99Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 2.60	Depositor
% Data completeness (in resolution range)	97.8 (20.00-2.60)	Depositor
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	REFMAC 5.1.24	Depositor
R, R_{free}	0.203 , 0.251	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	7273	wwPDB-VP
Average B, all atoms (Å^2)	52.0	wwPDB-VP

5 Model quality ⓘ

5.1 Standard geometry ⓘ

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	0.50	0/3325	0.93	14/4523 (0.3%)
1	B	0.59	0/3324	0.98	12/4522 (0.3%)
2	C	0.62	0/278	1.27	4/369 (1.1%)
2	D	0.64	0/297	1.24	2/394 (0.5%)
All	All	0.55	0/7224	0.98	32/9808 (0.3%)

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
2	C	1	0
2	D	0	1
All	All	1	1

There are no bond length outliers.

The worst 5 of 32 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	203	ASP	CB-CG-OD2	7.88	125.39	118.30
1	A	321	ARG	NE-CZ-NH1	7.63	124.11	120.30
1	A	321	ARG	NE-CZ-NH2	-7.58	116.51	120.30
2	D	16	ASP	CB-CG-OD2	7.51	125.06	118.30
1	B	435	ASP	CB-CG-OD2	7.33	124.90	118.30

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	C	33	SER	CA

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	D	27	SER	Peptide

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	A	3274	0	3322	28	0
1	B	3273	0	3327	34	0
2	C	278	0	286	7	0
2	D	297	0	303	15	0
3	A	41	0	0	4	0
3	B	92	0	0	4	1
3	C	7	0	0	0	0
3	D	11	0	0	6	0
All	All	7273	0	7238	78	1

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 5.

The worst 5 of 78 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)
2:D:46:ARG:CB	3:D:2010:HOH:O	2.16	0.94
2:C:38:ARG:HD2	2:C:38:ARG:O	1.76	0.85
1:A:492:ASN:HD22	1:A:493:GLU:N	1.79	0.81
1:B:128:GLN:HG3	3:B:2009:HOH:O	1.82	0.80
1:B:492:ASN:HD22	1:B:494:ASN:H	1.37	0.72

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:B:2023:HOH:O	3:B:2053:HOH:O[2_555]	1.90	0.30

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	
1	A	421/454 (93%)	409 (97%)	11 (3%)	1 (0%)	47	71
1	B	421/454 (93%)	410 (97%)	10 (2%)	1 (0%)	47	71
2	C	32/51 (63%)	26 (81%)	3 (9%)	3 (9%)	0	0
2	D	35/51 (69%)	26 (74%)	4 (11%)	5 (14%)	0	0
All	All	909/1010 (90%)	871 (96%)	28 (3%)	10 (1%)	14	30

5 of 10 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	C	33	SER
2	D	44	PRO
2	C	45	LYS
2	D	36	MET
2	D	39	ARG

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	A	362/389 (93%)	332 (92%)	30 (8%)	11	22
1	B	362/389 (93%)	342 (94%)	20 (6%)	21	43
2	C	28/44 (64%)	23 (82%)	5 (18%)	2	2
2	D	30/44 (68%)	24 (80%)	6 (20%)	1	2
All	All	782/866 (90%)	721 (92%)	61 (8%)	12	25

5 of 61 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	496	LYS
2	D	17	SER
1	B	206	ASP
2	C	46	ARG
2	D	37	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 7 such sidechains are listed below:

Mol	Chain	Res	Type
1	A	492	ASN
1	B	192	GLN
1	B	492	ASN
1	B	227	ASN
1	A	227	ASN

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 (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.