



# Full wwPDB/EMDatabank EM Map/Model Validation Report ⓘ

Dec 23, 2019 – 11:00 PM EST

PDB ID : 6V6B  
EMDB ID: : EMD-21067  
Title : Structures of GCP2 and GCP3 in the native human gamma-tubulin ring complex  
Authors : Wiczorek, M.; Urnavicius, L.; Ti, S.; Molloy, K.R.; Chait, B.T.; Kapoor, T.M.  
Deposited on : 2019-12-04  
Resolution : 3.80 Å (reported)

This is a Full wwPDB/EMDatabank EM Map/Model Validation Report  
for a publicly released PDB/EMDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>  
with specific help available everywhere you see the ⓘ symbol.

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MolProbity : 4.02b-467  
Percentile statistics : 20171227.v01 (using entries in the PDB archive December 27th 2017)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.4

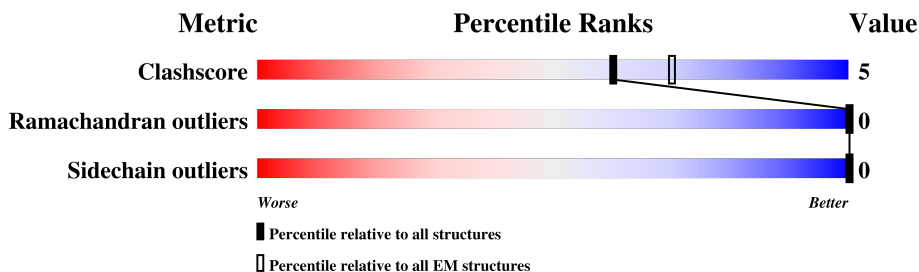
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*



The reported resolution of this entry is 3.80 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)	EM structures (#Entries)
Clashscore	136327	1886
Ramachandran outliers	132723	1663
Sidechain outliers	132532	1531

The table below summarises the geometric issues observed across the polymeric chains. The red, orange, yellow and green segments on the bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. 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	B	907	 54% 9% 37%
2	C	930	 50% 8% 42%

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 9115 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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 Gamma-tubulin complex component 3.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	B	572	Total	C	N	O	S	0	0
			4744	3034	832	853	25		

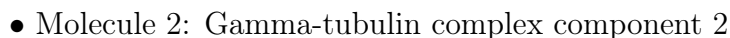
- Molecule 2 is a protein called Gamma-tubulin complex component 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	C	539	Total	C	N	O	S	0	0
			4371	2825	721	795	30		



- Molecule 1: Gamma-tubulin complex component 3

Response	Percentage
Yes	54%
No	9%
Don't know	37%



Frequency	Percentage
Daily	50%
Weekly	8%
Not at all	42%






## 4 Experimental information

Property	Value	Source
Reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	Depositor
Number of particles used	351714	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	45	Depositor
Minimum defocus (nm)	Not provided	Depositor
Maximum defocus (nm)	Not provided	Depositor
Magnification	Not provided	Depositor
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor

## 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  >2	RMSZ	# Z  >2
1	B	0.29	0/4839	0.40	0/6522
2	C	0.30	0/4461	0.42	0/6020
All	All	0.29	0/9300	0.41	0/12542

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 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	B	4744	0	4722	51	0
2	C	4371	0	4360	42	0
All	All	9115	0	9082	92	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 5.

All (92) 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:B:608:THR:HG23	1:B:610:ALA:H	1.52	0.72
1:B:464:TYR:OH	1:B:491:ASN:ND2	2.24	0.71

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:259:GLN:NE2	2:C:350:GLN:OE1	2.23	0.71
2:C:536:GLU:HG3	2:C:539:ALA:HB3	1.78	0.65
2:C:276:VAL:HG23	2:C:277:ASP:H	1.63	0.64
1:B:262:ASP:OD1	1:B:262:ASP:N	2.32	0.61
2:C:462:ILE:HG12	2:C:479:LEU:HD22	1.81	0.60
2:C:350:GLN:O	2:C:350:GLN:NE2	2.35	0.60
2:C:264:GLN:HE21	2:C:275:LEU:HB3	1.66	0.60
2:C:502:GLU:O	2:C:515:GLN:NE2	2.35	0.59
1:B:620:ARG:HH11	1:B:644:VAL:HA	1.67	0.59
1:B:247:GLU:OE1	1:B:363:THR:OG1	2.21	0.59
1:B:675:TYR:HA	1:B:678:THR:HG22	1.83	0.59
2:C:236:LEU:HD22	2:C:241:GLN:HB3	1.84	0.58
2:C:310:SER:O	2:C:318:HIS:NE2	2.32	0.58
1:B:434:ILE:HD11	1:B:483:VAL:HG12	1.86	0.58
2:C:642:GLU:O	2:C:671:ARG:NH1	2.37	0.57
2:C:423:ILE:HG23	2:C:481:THR:HG21	1.87	0.56
2:C:542:ARG:NH2	2:C:738:GLU:OE1	2.38	0.56
1:B:805:GLN:HA	1:B:808:GLU:HG2	1.86	0.56
1:B:546:LEU:HD11	1:B:742:GLN:HA	1.89	0.55
1:B:564:ARG:NH2	1:B:565:TYR:OH	2.39	0.55
2:C:468:PRO:HG2	2:C:471:LEU:HD12	1.89	0.55
1:B:790:ASP:N	1:B:790:ASP:OD1	2.40	0.55
2:C:604:ASP:HB2	2:C:647:ASP:HB2	1.89	0.54
2:C:847:GLU:O	2:C:851:ASN:ND2	2.41	0.53
2:C:298:TYR:HE1	2:C:328:VAL:HG13	1.74	0.53
1:B:624:ARG:HD3	1:B:661:LEU:HD21	1.89	0.52
1:B:674:GLU:OE1	1:B:719:GLN:NE2	2.43	0.52
1:B:799:GLU:OE2	1:B:803:ARG:NH1	2.35	0.52
1:B:790:ASP:HA	1:B:793:TYR:HB3	1.92	0.52
2:C:299:SER:O	2:C:299:SER:OG	2.28	0.52
1:B:553:TYR:CZ	1:B:647:PRO:HG2	2.45	0.51
1:B:330:GLN:OE1	1:B:333:ARG:NH1	2.43	0.51
1:B:384:LEU:HD11	1:B:400:VAL:HG23	1.93	0.51
1:B:451:ASP:HB3	1:B:463:LYS:HA	1.93	0.51
1:B:448:VAL:HG22	1:B:484:LEU:HD12	1.94	0.50
1:B:367:LEU:O	1:B:371:THR:HG22	2.12	0.50
1:B:401:HIS:HD2	1:B:473:SER:HB3	1.77	0.49
1:B:726:VAL:HG22	1:B:761:ARG:HB3	1.95	0.49
2:C:733:THR:HG22	2:C:757:PHE:HD1	1.78	0.49
1:B:865:LEU:HD21	1:B:876:LEU:HD23	1.94	0.49
2:C:304:PHE:CE2	2:C:308:LYS:HG3	2.48	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:441:ASP:N	1:B:441:ASP:OD1	2.46	0.48
1:B:564:ARG:NH2	1:B:613:ASP:OD1	2.46	0.48
1:B:647:PRO:O	1:B:650:THR:HG22	2.13	0.48
1:B:451:ASP:O	1:B:463:LYS:NZ	2.46	0.48
2:C:679:VAL:HG21	2:C:780:MET:HE1	1.95	0.48
1:B:449:ALA:HB2	1:B:467:ARG:HD2	1.96	0.48
1:B:479:GLN:NE2	1:B:531:GLN:OE1	2.40	0.48
1:B:581:LEU:HD23	1:B:585:LEU:HD11	1.95	0.48
2:C:320:LEU:HD13	2:C:387:LEU:HD11	1.94	0.48
1:B:430:LEU:HD21	1:B:475:MET:HE3	1.95	0.48
2:C:535:LYS:NZ	2:C:653:PRO:HG2	2.29	0.47
1:B:573:PHE:HB2	1:B:608:THR:HG21	1.96	0.47
1:B:501:THR:OG1	1:B:501:THR:O	2.31	0.46
2:C:291:ILE:HG23	2:C:356:ILE:HD13	1.95	0.46
1:B:741:ALA:HB1	1:B:746:HIS:HB2	1.98	0.45
2:C:748:ASP:OD1	2:C:748:ASP:N	2.50	0.45
2:C:420:GLU:OE2	2:C:503:ILE:N	2.43	0.45
2:C:327:LEU:HD12	2:C:366:LEU:HD11	1.97	0.44
2:C:416:PHE:O	2:C:420:GLU:HG3	2.17	0.44
2:C:460:TYR:OH	2:C:486:ASN:ND2	2.51	0.44
1:B:601:LEU:O	1:B:605:VAL:HG23	2.17	0.44
1:B:246:THR:HG23	1:B:249:ALA:H	1.82	0.44
2:C:731:GLU:HB3	2:C:732:PRO:HD3	2.00	0.43
2:C:583:LEU:HD22	2:C:603:ILE:HD11	2.01	0.43
2:C:690:ASN:OD1	2:C:691:LYS:N	2.52	0.43
1:B:401:HIS:CD2	1:B:473:SER:HB3	2.54	0.43
1:B:592:LEU:HD23	1:B:592:LEU:HA	1.86	0.43
1:B:398:SER:OG	1:B:473:SER:HB2	2.19	0.43
1:B:753:VAL:O	1:B:757:THR:HG23	2.19	0.43
2:C:456:TRP:CE3	2:C:483:LYS:HD3	2.54	0.42
1:B:255:LEU:HD23	1:B:255:LEU:HA	1.83	0.42
2:C:276:VAL:HG23	2:C:277:ASP:N	2.32	0.42
2:C:274:PHE:HE1	2:C:296:ALA:HB2	1.85	0.42
2:C:713:ARG:HG2	2:C:857:PHE:HE2	1.85	0.41
2:C:547:TYR:CD2	2:C:601:LEU:HD11	2.56	0.41
2:C:552:GLN:NE2	2:C:591:THR:HG23	2.35	0.41
2:C:262:SER:OG	2:C:263:ALA:N	2.53	0.41
2:C:560:MET:O	2:C:564:GLU:HB2	2.20	0.41
1:B:833:ILE:O	1:B:837:LYS:HG2	2.20	0.41
1:B:562:MET:SD	1:B:660:TYR:HE2	2.43	0.41
2:C:292:LEU:HD23	2:C:292:LEU:HA	1.84	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:303:LYS:HE2	1:B:303:LYS:HB2	1.85	0.41
2:C:758:LEU:HD23	2:C:758:LEU:HA	1.86	0.41
1:B:433:TRP:CE2	1:B:487:GLY:HA3	2.56	0.41
1:B:451:ASP:O	1:B:463:LYS:HG3	2.22	0.40
2:C:639:SER:HB3	2:C:640:GLY:H	1.67	0.40
1:B:304:ILE:HD12	1:B:381:LEU:HB3	2.03	0.40
1:B:553:TYR:CE2	1:B:647:PRO:HG2	2.57	0.40
1:B:779:PHE:HA	1:B:782:ILE:HD12	2.04	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 PDB entries followed by that with respect to all EM 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	B	552/907 (61%)	530 (96%)	22 (4%)	0	100	100
2	C	521/930 (56%)	488 (94%)	33 (6%)	0	100	100
All	All	1073/1837 (58%)	1018 (95%)	55 (5%)	0	100	100

There are no Ramachandran outliers to report.

### 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 PDB entries followed by that with respect to all EM 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	B	519/798 (65%)	519 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	C	481/816 (59%)	481 (100%)	0	100	100
All	All	1000/1614 (62%)	1000 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (14) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	345	GLN
1	B	401	HIS
1	B	491	ASN
1	B	570	GLN
1	B	643	HIS
1	B	665	ASN
1	B	705	HIS
1	B	830	ASN
1	B	846	GLN
2	C	264	GLN
2	C	342	HIS
2	C	486	ASN
2	C	682	GLN
2	C	716	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 carbohydrates in this entry.

## 5.6 Ligand geometry ⓘ

There are no ligands in this entry.

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.