WORLDWIDE wwPDB PROTEIN DATA BANK

wwPDB EM Validation Summary Report ⓘ

Aug 17, 2025 – 12:09 AM JST

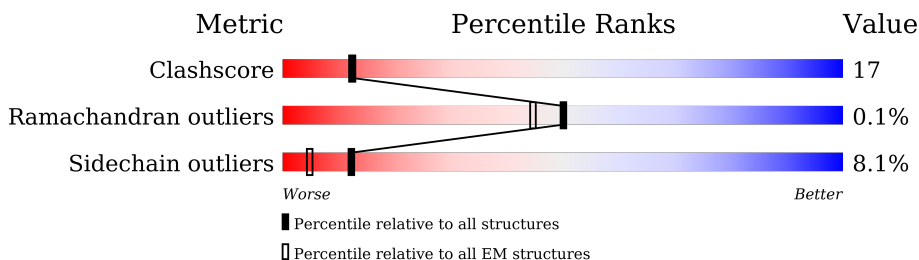|		
PDB ID	:	9L0D / pdb_00009l0d
EMDB ID	:	EMD-62697
Title	:	Cryo-EM structure of the human MON1A/CCZ1/C18orf8 complex
Authors	:	Tang, Y.; Han, Y.; Zhang, Y.; Pan, L.
Deposited on	:	2024-12-12
Resolution	:	3.41 Å(reported)

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 3.41 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		17
Ramachandran outliers		0.1%
Sidechain outliers		8.1%

Worse   *Better*

▮ Percentile relative to all structures
▯ Percentile relative to all EM structures

Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the 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%

Mol	Chain	Length	Quality of chain
1	A	418	49% 45% 6%
2	B	482	67% 27% • •
3	C	657	62% 35% •
4	D	207	49% 32% • 14%

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2 Entry composition ⓘ

There are 4 unique types of molecules in this entry. The entry contains 13894 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 Vacuolar fusion protein MON1 homolog A.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	417	Total 3349	C 2136	N 593	O 609	S 11	0	0

- Molecule 2 is a protein called Vacuolar fusion protein CCZ1 homolog B.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	466	Total 3837	C 2465	N 642	O 707	S 23	0	0

- Molecule 3 is a protein called Regulator of MON1-CCZ1 complex.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	C	657	Total 5280	C 3391	N 900	O 960	S 29	0	0

- Molecule 4 is a protein called Ras-related protein Rab-7a.

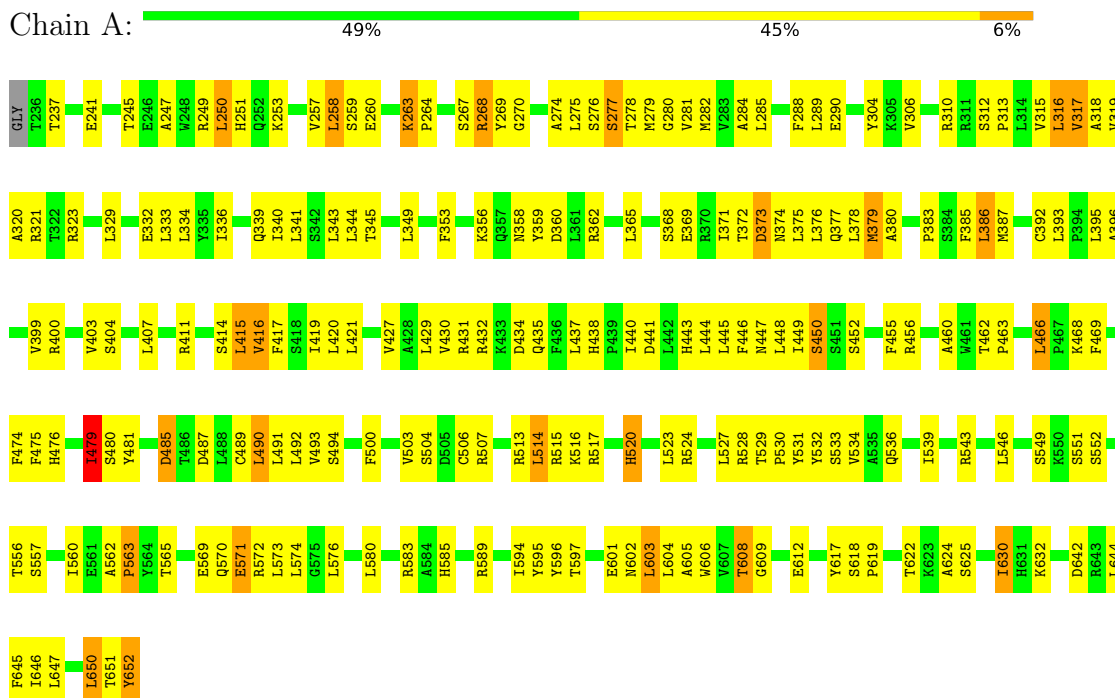| Mol	Chain	Residues	Atoms					AltConf	Trace
4	D	178	Total 1428	C 908	N 241	O 273	S 6	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	22	ASN	THR	conflict	UNP P51149

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.

• Molecule 1: Vacuolar fusion protein MON1 homolog A

Chain A:

• Molecule 2: Vacuolar fusion protein CCZ1 homolog B

Chain B:

E462 V463 V467 K468 T473 Q474 F475 N476 N477 I478 F479 D482

• Molecule 3: Regulator of MON1-CCZ1 complex

Chain C: 62% 35% •

M1 G2 E3 E4 D5 L8 E9 L10 C11 E12 V15 Q16 F17 E18 K19 D29 E30 A31 N32 K33 Q34 V35 F36 A37 V38 R39 S40 T44 V48 K49 I57 R60 K64 I70 K71 E75 N76 K77 I78 R83 F90 L100 E101 Y102 T103 Q104 E105

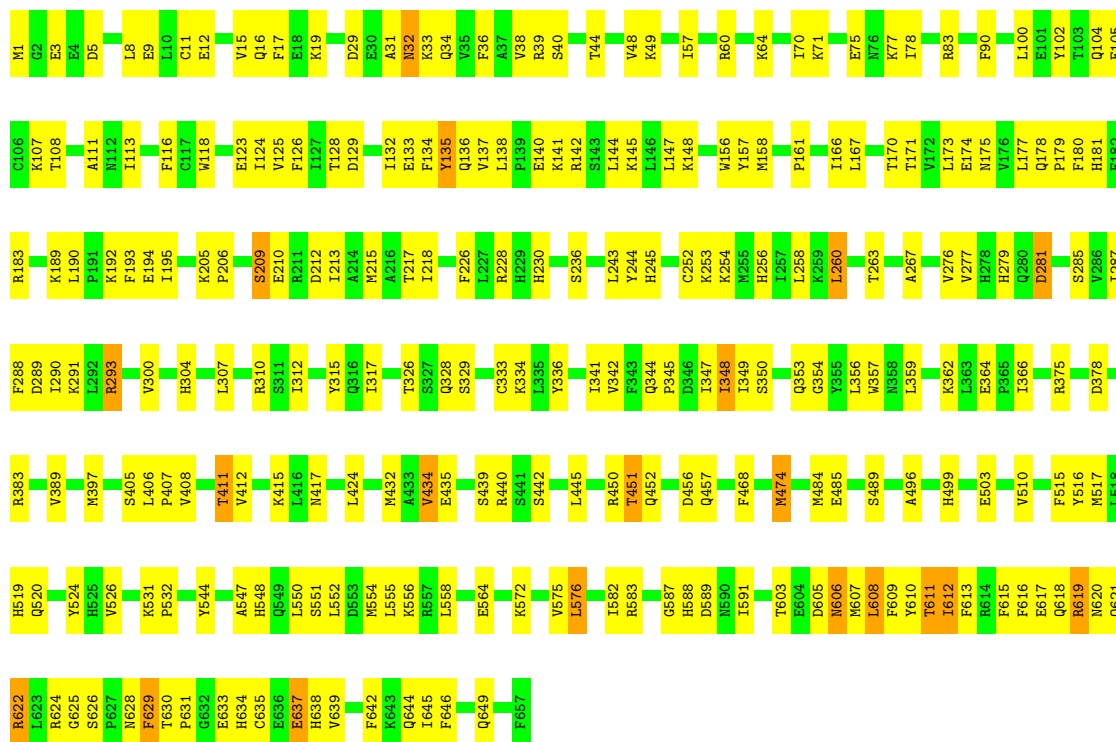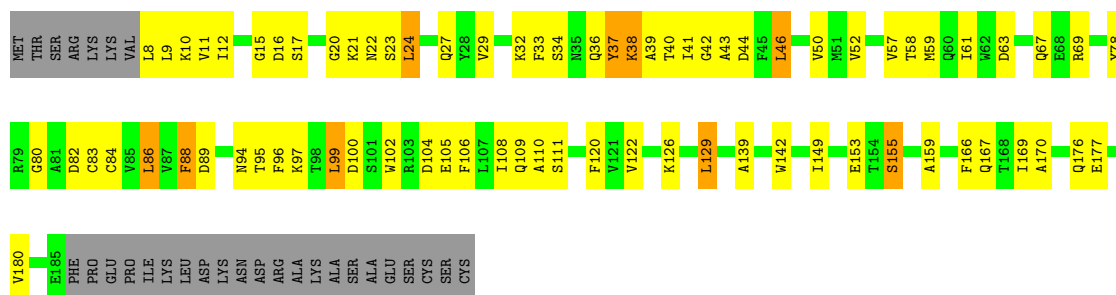C106 K107 T108 A111 N112 I113 F116 C117 W118 E123 I124 V125 F126 I127 T128 D129 I132 E133 F134 Y135 Q136 V137 L138 P139 E140 K141 R142 S143 L144 K145 L146 L147 K148 W156 Y157 M158 P161 I166 L167 T170 T171 V172 L173 E174 N175 V176 L177 Q178 P179 F180 H181 F182

R183 K189 L190 P191 K192 F193 E194 I195 K205 P206 S209 E210 R211 D212 I213 A214 M215 A216 T217 I218 F226 L227 R228 H229 H230 S236 L243 Y244 H245 C252 K253 K254 M255 H256 I257 L258 K259 L260 T263 A267 V276 V277 H278 H279 Q280 D281 S285 V286 I287

F288 D289 I290 K291 L292 R293 V300 H304 L307 R310 S311 I312 Y315 Q316 I317 T326 S327 Q328 S329 C333 K334 L335 Y336 I341 V342 F343 Q344 P345 D346 I347 I348 I349 S350 Q353 G354 Y355 L356 W357 N358 L359 K362 L363 E364 P365 I366 R375 D378

R383 V389 M397 S405 L406 P407 V408 T411 V412 K415 L416 N417 L424 M432 A433 V434 E435 S439 R440 S441 S442 L445 R450 T451 Q452 D456 Q457 F468 M474 M484 E485 S489 A496 H499 E503 V510 F515 Y516 M517 L518

H519 Q520 Y524 H525 V526 K531 P532 Y544 A547 H548 Q549 L550 S551 L552 D553 M554 L555 K556 R557 L558 E564 K572 V575 L576 I582 R583 G587 H588 D589 N590 I591 T603 E604 D605 N606 M607 L608 F609 Y610 T611 I612 F613 R614 F615 F616 E617 Q618 R619 N620 Q621

R622 L623 R624 G625 S626 P627 N628 F629 T630 P631 G632 E633 H634 C635 E636 E637 H638 V639 F642 K643 Q644 I645 F646 Q649 F657

• Molecule 4: Ras-related protein Rab-7a

Chain D: 49% 32% • 14%

MET THR SER ARG LYS LYS VAL L8 L9 K10 V11 I12 G15 D16 S17 G20 K21 N22 S23 L24 Q27 Y28 V29 K32 F33 S34 N35 Q36 Y37 K38 A39 T40 I41 G42 A43 D44 F45 L46 V50 M51 V52 V57 T58 M59 Q60 I61 W62 D63 Q67 E68 R69 Y78

R79 G80 A81 D82 C83 C84 V85 L86 V87 F88 D89 N94 T95 F96 K97 T98 L99 D100 S101 W102 R103 D104 E105 F106 L107 I108 Q109 A110 S111 F120 V121 V122 K126 L129 A139 W142 I149 E153 T154 S155 A159 F166 Q167 T168 I169 A170 Q176 E177

V180 E185 PHE PRO GLU PRO ILE LYS LEU ASP LYS ASN ASP ARG ALA LYS ALA SER ALA GLU SER CYS SER CYS

4   Experimental information ⓘ

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	77193	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TECNAI SPIRIT	Depositor
Voltage (kV)	300	Depositor
Electron dose $(e^-/\text{Å}^2)$	49.4	Depositor
Minimum defocus (nm)	1400	Depositor
Maximum defocus (nm)	2400	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor

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	0.25	0/3423	0.53	1/4636 (0.0%)
2	B	0.28	0/3927	0.46	0/5298
3	C	0.21	0/5404	0.45	0/7319
4	D	0.27	0/1455	0.55	0/1970
All	All	0.25	0/14209	0.48	1/19223 (0.0%)

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	A	0	2
3	C	0	2
All	All	0	4

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	479	ILE	N-CA-C	5.06	114.06	106.42

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	275	LEU	Peptide
1	A	277	SER	Peptide
3	C	611	THR	Peptide
3	C	649	GLN	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	3349	0	3361	147	0
2	B	3837	0	3809	90	0
3	C	5280	0	5310	184	0
4	D	1428	0	1405	56	0
All	All	13894	0	13885	465	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 17.

The worst 5 of 465 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:A:339:GLN:HE22	1:A:371:ILE:HG22	1.43	0.83
4:D:34:SER:HB3	4:D:46:LEU:HB3	1.62	0.81
1:A:455:PHE:HD1	1:A:479:ILE:HG12	1.45	0.81
3:C:519:HIS:HD1	3:C:544:TYR:HH	1.25	0.80
3:C:612:ILE:O	3:C:616:PHE:N	2.13	0.80

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 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	A	415/418 (99%)	388 (94%)	26 (6%)	1 (0%)	44	73
2	B	464/482 (96%)	431 (93%)	33 (7%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
3	C	655/657 (100%)	615 (94%)	39 (6%)	1 (0%)	44	73
4	D	176/207 (85%)	162 (92%)	14 (8%)	0	100	100
All	All	1710/1764 (97%)	1596 (93%)	112 (6%)	2 (0%)	50	78

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	C	606	ASN
1	A	563	PRO

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	A	359/359 (100%)	315 (88%)	44 (12%)	4	14
2	B	431/436 (99%)	407 (94%)	24 (6%)	17	43
3	C	593/593 (100%)	553 (93%)	40 (7%)	13	38
4	D	155/181 (86%)	139 (90%)	16 (10%)	6	22
All	All	1538/1569 (98%)	1414 (92%)	124 (8%)	12	31

5 of 124 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	352	VAL
4	D	24	LEU
3	C	60	ARG
4	D	23	SER
4	D	86	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 37 such sidechains are listed below:

Mol	Chain	Res	Type
3	C	382	GLN
4	D	148	ASN
3	C	417	ASN
3	C	620	ASN
1	A	570	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 oligosaccharides 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.

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