



Full wwPDB X-ray Structure Validation Report ⓘ

Jan 31, 2016 – 07:40 PM GMT

PDB ID : 1GRN
Title : CRYSTAL STRUCTURE OF THE CDC42/CDC42GAP/ALF3 COMPLEX.
Authors : Nassar, N.; Hoffman, G.R.; Clardy, J.C.; Cerione, R.A.
Deposited on : 1998-07-30
Resolution : 2.10 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.
We welcome your comments at validation@mail.wwpdb.org
A user guide is available at
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467
Mogul : 1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix) : **NOT EXECUTED**
EDS : **NOT EXECUTED**
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : trunk26865

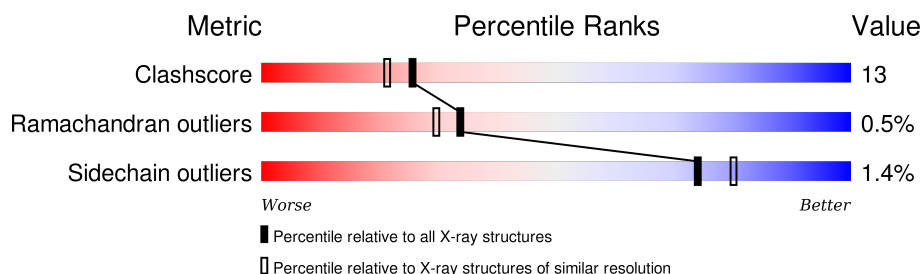
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.10 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)	Similar resolution (#Entries, resolution range(Å))
Clashscore	102246	4460 (2.10-2.10)
Ramachandran outliers	100387	4413 (2.10-2.10)
Sidechain outliers	100360	4414 (2.10-2.10)

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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 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 $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	191	 74% 25% .
2	B	203	 62% 34% .

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 3185 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 PROTEIN (GTP BINDING PROTEIN).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	191	Total	C	N	O	S	0	0	0
			1494	960	242	284	8			

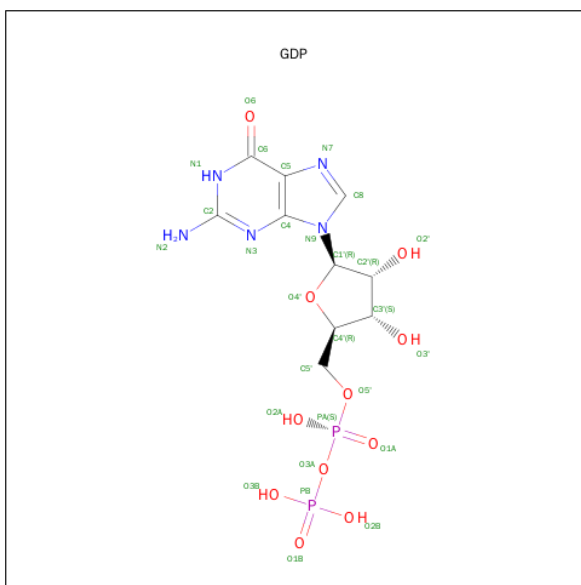
- Molecule 2 is a protein called PROTEIN (RHO GTPASE ACTIVATING PROTEIN).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	197	Total	C	N	O	S	0	0	0
			1586	1024	268	292	2			

- Molecule 3 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

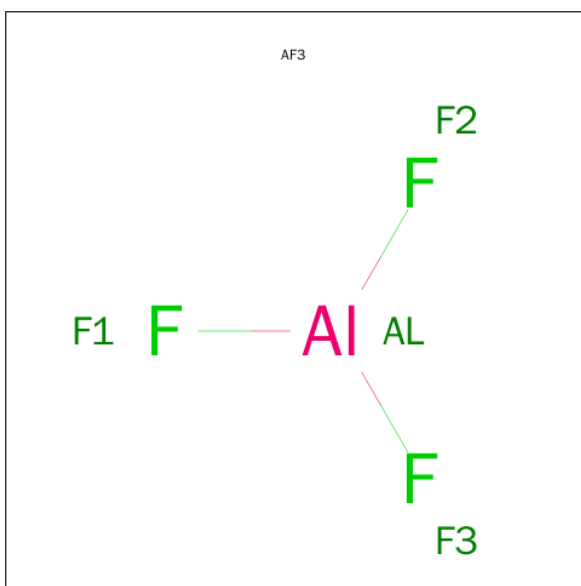
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Mg	0	0
			1	1		

- Molecule 4 is GUANOSINE-5'-DIPHOSPHATE (three-letter code: GDP) (formula: C₁₀H₁₅N₅O₁₁P₂).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	N	O	P	0	0
			28	10	5	11	2		

- Molecule 5 is ALUMINUM FLUORIDE (three-letter code: AF3) (formula: AlF_3).

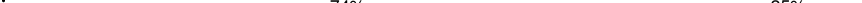



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total 4	Al 1	F 3	0	0

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	39	Total 39	O 39	0	0
6	B	33	Total 33	O 33	0	0

Note EDS was not executed.

- Chain A:  74% 25%
-  Chain A sequence logo showing amino acid frequencies at each position. The y-axis lists amino acids: E140, K144, L149, K150, Y154, Q162, K163, G164, V168, L177, P180, R186, L190, L191, M1, V7, A13, M26, V33, P34, V44, V45, E49, F56, Q61, E62, D63, Y64, R68, P69, L70, S71, Y72, P73, S83, V84, S85, S86, S87, S88, E91, D92, V93, K94, V98, H104, L112, T115, Q116, I117, D122, L126, M132, K133, Q134. The x-axis represents positions 1 to 134. The logo is color-coded: green for positions 1-73 (74%), yellow for positions 74-112 (25%), and orange for positions 113-134 (25%).

- Chain B:

4 Data and refinement statistics

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

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	52.40 Å 69.00 Å 129.60 Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	30.00 – 2.10	Depositor
% Data completeness (in resolution range)	85.9 (30.00-2.10)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	0.06	Depositor
Refinement program	X-PLOR 3.851	Depositor
R, R_{free}	0.211 , 0.259	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	3185	wwPDB-VP
Average B, all atoms (Å ²)	30.0	wwPDB-VP

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: GDP, MG, AF3

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	0.49	2/1527 (0.1%)	0.60	0/2076
2	B	0.33	0/1624	0.54	0/2218
All	All	0.42	2/3151 (0.1%)	0.57	0/4294

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	49	GLU	CD-OE1	10.52	1.37	1.25
1	A	49	GLU	CD-OE2	-8.29	1.16	1.25

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	A	1494	0	1521	30	1
2	B	1586	0	1586	52	0
3	A	1	0	0	0	0
4	A	28	0	12	2	0
5	A	4	0	0	0	0
6	A	39	0	0	0	0
6	B	33	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	3185	0	3119	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 13.

All (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)
1:A:64:TYR:HE1	2:B:436:ILE:HD11	1.38	0.87
1:A:98:VAL:HG21	1:A:149:LEU:HD13	1.60	0.81
2:B:392:ARG:HH11	2:B:455:PRO:HG2	1.56	0.70
2:B:392:ARG:NH1	2:B:455:PRO:HG2	2.08	0.68
2:B:312:VAL:O	2:B:315:GLU:HG2	1.95	0.67
2:B:428:ASP:HB3	2:B:431:ILE:HG13	1.77	0.67
1:A:140:GLU:O	1:A:144:LYS:HG3	1.95	0.65
2:B:313:VAL:HG23	2:B:340:ILE:HD13	1.79	0.63
2:B:261:PRO:O	2:B:262:ASN:HB2	2.00	0.61
1:A:7:VAL:HG22	1:A:56:PHE:HB2	1.85	0.59
2:B:293:LEU:HD21	2:B:337:PRO:HG2	1.85	0.59
2:B:304:PHE:CE1	2:B:341:LEU:HD23	2.39	0.57
2:B:266:GLY:HA2	2:B:347:GLU:O	2.05	0.57
1:A:62:GLU:CD	1:A:62:GLU:H	2.06	0.57
2:B:351:PRO:HB3	2:B:424:LEU:HA	1.89	0.55
2:B:351:PRO:HG3	2:B:425:TRP:CE2	2.42	0.55
2:B:265:PHE:HD1	2:B:321:ASN:HD21	1.54	0.55
2:B:303:ILE:O	2:B:304:PHE:HB2	2.08	0.54
2:B:309:ASN:O	2:B:313:VAL:HG12	2.07	0.54
2:B:405:SER:HA	2:B:408:ASN:OD1	2.08	0.53
1:A:70:LEU:HD12	2:B:433:LEU:HD22	1.90	0.53
2:B:396:ALA:O	2:B:399:VAL:HG22	2.08	0.53
1:A:26:ASN:HA	1:A:162:GLN:HE22	1.73	0.53
2:B:435:ALA:O	2:B:439:ILE:HG13	2.09	0.53
2:B:313:VAL:O	2:B:317:GLN:HG3	2.08	0.52
2:B:270:GLN:HG3	2:B:271:HIS:N	2.24	0.52
1:A:64:TYR:CE1	2:B:436:ILE:HD11	2.30	0.52
1:A:133:LYS:O	1:A:134:GLN:HG3	2.10	0.51
1:A:164:GLY:O	1:A:168:VAL:HG23	2.10	0.51
2:B:301:GLU:HA	2:B:408:ASN:HA	1.91	0.51
2:B:437:ASN:HB2	2:B:438:PRO:HD3	1.92	0.51
2:B:357:LEU:HD22	2:B:379:VAL:HG13	1.93	0.51
1:A:83:SER:HB3	1:A:86:SER:HB3	1.93	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:397:PHE:O	2:B:400:GLN:HB3	2.12	0.50
1:A:44:VAL:HG12	1:A:45:MET:N	2.27	0.50
2:B:293:LEU:HD22	2:B:303:ILE:HD11	1.93	0.50
2:B:357:LEU:HD22	2:B:379:VAL:CG1	2.43	0.49
2:B:413:THR:OG1	2:B:444:LYS:HE2	2.13	0.49
2:B:290:VAL:O	2:B:294:GLN:HG3	2.13	0.49
1:A:104:HIS:O	1:A:190:LEU:HD21	2.14	0.48
2:B:358:TYR:HB3	2:B:359:PRO:HD3	1.96	0.48
2:B:313:VAL:HG23	2:B:340:ILE:CD1	2.45	0.47
2:B:328:PHE:HA	2:B:331:TYR:HD2	1.80	0.46
1:A:180:PRO:HB3	1:A:186:ARG:HG3	1.98	0.46
2:B:395:THR:HB	2:B:450:GLN:NE2	2.30	0.46
2:B:304:PHE:CZ	2:B:341:LEU:HD23	2.50	0.46
2:B:386:GLU:O	2:B:390:VAL:HG23	2.16	0.46
1:A:132:ASN:HD21	2:B:332:ASN:HB3	1.79	0.46
1:A:88:SER:HA	1:A:91:GLU:HG2	1.97	0.45
2:B:297:ALA:HB1	2:B:303:ILE:HD13	1.98	0.45
1:A:26:ASN:HA	1:A:162:GLN:NE2	2.31	0.45
2:B:353:LEU:O	2:B:357:LEU:HG	2.16	0.45
1:A:68:ARG:HB3	1:A:69:PRO:HD3	1.99	0.45
1:A:84:VAL:HG21	1:A:117:ILE:HA	1.98	0.45
2:B:428:ASP:HB3	2:B:431:ILE:CG1	2.46	0.44
1:A:13:ALA:HA	4:A:198:GDP:H5'	1.99	0.44
2:B:321:ASN:HD22	2:B:321:ASN:N	2.16	0.44
1:A:72:TYR:N	1:A:73:PRO:CD	2.81	0.44
2:B:280:GLU:HA	2:B:281:PRO:HD2	1.88	0.43
2:B:303:ILE:O	2:B:410:MET:HG3	2.18	0.43
1:A:84:VAL:HG22	1:A:115:THR:O	2.19	0.43
2:B:310:THR:O	2:B:314:ARG:HG3	2.18	0.43
2:B:411:THR:HG23	2:B:414:ASN:H	1.84	0.42
1:A:122:ASP:O	1:A:126:ILE:HG12	2.19	0.42
1:A:177:LEU:HD23	1:A:177:LEU:HA	1.90	0.42
1:A:93:VAL:HG11	1:A:112:LEU:HD11	2.01	0.42
2:B:273:GLN:NE2	2:B:276:ASN:HB3	2.35	0.42
2:B:279:GLN:OE1	2:B:279:GLN:HA	2.19	0.42
1:A:116:GLN:HG2	4:A:198:GDP:C5	2.55	0.42
2:B:264:GLN:O	2:B:344:PHE:HE1	2.02	0.42
2:B:375:ALA:O	2:B:379:VAL:HG23	2.20	0.41
2:B:264:GLN:H	2:B:321:ASN:ND2	2.18	0.41
1:A:112:LEU:HB3	1:A:154:TYR:HD1	1.85	0.41
1:A:150:LYS:HE2	1:A:150:LYS:HB2	1.91	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:304:PHE:HE1	2:B:341:LEU:HD23	1.85	0.41
2:B:428:ASP:HB3	2:B:431:ILE:CD1	2.50	0.40
1:A:61:GLN:HB3	1:A:63:ASP:OD2	2.20	0.40
1:A:33:VAL:HA	1:A:34:PRO:HD2	1.96	0.40

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)
1:A:45:MET:O	1:A:191:LEU:N[4_555]	2.08	0.12

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	189/191 (99%)	178 (94%)	11 (6%)	0	100	100
2	B	195/203 (96%)	189 (97%)	4 (2%)	2 (1%)	19	13
All	All	384/394 (98%)	367 (96%)	15 (4%)	2 (0%)	34	30

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	261	PRO
2	B	354	THR

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	171/171 (100%)	169 (99%)	2 (1%)	78	84
2	B	177/183 (97%)	174 (98%)	3 (2%)	68	74
All	All	348/354 (98%)	343 (99%)	5 (1%)	74	80

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	94	LYS
1	A	112	LEU
2	B	261	PRO
2	B	311	GLN
2	B	392	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	39	ASN
1	A	132	ASN
1	A	162	GLN
2	B	263	GLN
2	B	321	ASN
2	B	400	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 carbohydrates in this entry.

5.6 Ligand geometry

Of 3 ligands modelled in this entry, 1 is monoatomic - leaving 2 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the chemical component dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
4	GDP	A	198	3,5	23,30,30	1.56	7 (30%)	30,47,47	2.33	5 (16%)
5	AF3	A	200	3,4,6	0,3,3	0.00	-	0,3,3	0.00	-

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the chemical component dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	GDP	A	198	3,5	-	0/12/32/32	0/3/3/3
5	AF3	A	200	3,4,6	-	0/0/0/0	0/0/0/0

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	198	GDP	C8-N7	-2.51	1.29	1.34
4	A	198	GDP	PB-O2B	-2.17	1.46	1.54
4	A	198	GDP	PA-O2A	-2.12	1.45	1.54
4	A	198	GDP	C2-N1	2.17	1.39	1.35
4	A	198	GDP	C6-C5	2.17	1.45	1.41
4	A	198	GDP	O4'-C1'	2.58	1.44	1.41
4	A	198	GDP	C6-N1	4.11	1.40	1.33

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	198	GDP	C5-C6-N1	-8.82	111.53	123.59
4	A	198	GDP	N3-C2-N1	-2.57	123.53	127.44
4	A	198	GDP	O3A-PA-O5'	-2.06	97.47	102.94
4	A	198	GDP	O2B-PB-O1B	2.76	119.45	110.58
4	A	198	GDP	C6-N1-C2	6.75	125.31	115.94

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	198	GDP	2	0

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.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

EDS was not executed - this section will therefore be empty.

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

EDS was not executed - this section will therefore be empty.

6.3 Carbohydrates [i](#)

EDS was not executed - this section will therefore be empty.

6.4 Ligands [i](#)

EDS was not executed - this section will therefore be empty.

6.5 Other polymers [i](#)

EDS was not executed - this section will therefore be empty.