W O R L D W I D E
wwPDB
PROTEIN DATA BANK

wwPDB X-ray Structure Validation Summary Report ⓘ

Aug 7, 2023 – 05:54 AM EDT

PDB ID	:	1N86
Title	:	Crystal structure of human D-dimer from cross-linked fibrin complexed with GPR and GHRPLDK peptide ligands.
Authors	:	Yang, Z.; Pandi, L.; Doolittle, R.F.
Deposited on	:	2002-11-19
Resolution	:	3.20 Å(reported)

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

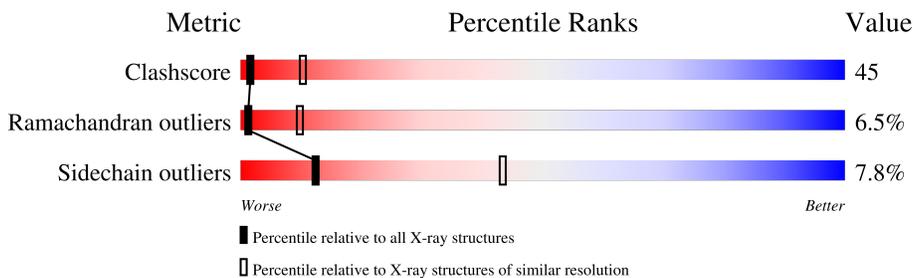|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35

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 3.20 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		45
Ramachandran outliers		6.5%
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	1253 (3.20-3.20)
Ramachandran outliers	138981	1234 (3.20-3.20)
Sidechain outliers	138945	1233 (3.20-3.20)

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	87	23% 57% 5% 15%
1	D	87	24% 52% 8% • 15%
2	B	328	34% 50% 8% • 6%
2	E	328	32% 52% 8% • 6%
3	C	324	39% 45% 7% 9%
3	F	324	40% 44% 7% 9%
4	G	3	100%
4	H	3	67% 33%

Continued from previous page...

Mol	Chain	Length	Quality of chain
5	I	7	57% 43%
5	J	7	57% 43%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
6	NDG	B	470	-	-	X	-

2 Entry composition ⓘ

There are 8 unique types of molecules in this entry. The entry contains 11054 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 Fibrin alpha/alpha-E chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	74	Total	C	N	O	S	0	0	0
			608	377	115	113	3			
1	D	74	Total	C	N	O	S	0	0	0
			608	377	115	113	3			

- Molecule 2 is a protein called Fibrin beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	307	Total	C	N	O	S	0	0	0
			2462	1535	433	472	22			
2	E	307	Total	C	N	O	S	0	0	0
			2462	1535	433	472	22			

- Molecule 3 is a protein called Fibrin gamma chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	295	Total	C	N	O	S	0	0	0
			2364	1498	399	456	11			
3	F	295	Total	C	N	O	S	0	0	0
			2364	1498	399	456	11			

- Molecule 4 is a protein called fibrin alpha chain peptide ligand fragment Gly-Pro-Arg.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
4	G	3	Total	C	N	O	0	0	0
			23	13	6	4			
4	H	3	Total	C	N	O	0	0	0
			23	13	6	4			

- Molecule 5 is a protein called fibrin beta chain peptide ligand fragment Gly-His-Arg-Pro-Leu-Asp-Lys.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
5	I	4	Total 32	C 19	N 9	O 4	0	0	0
5	J	4	Total 32	C 19	N 9	O 4	0	0	0

- Molecule 6 is 2-acetamido-2-deoxy-alpha-D-glucopyranose (three-letter code: NDG) (formula: $C_8H_{15}NO_6$).
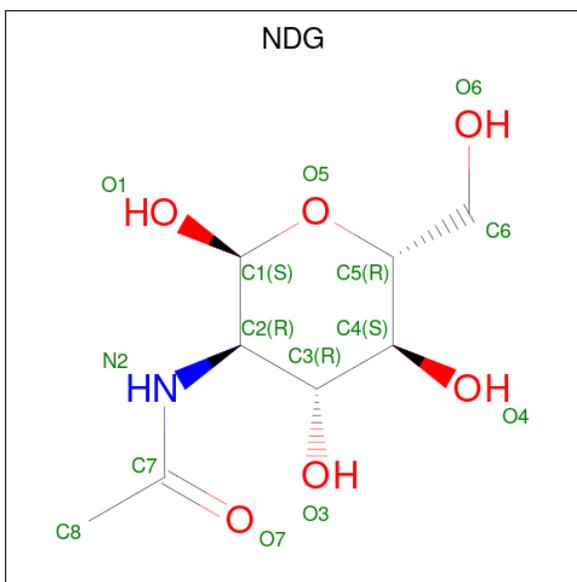
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	B	1	Total 15	C 8	N 1	O 6	0	0
6	E	1	Total 15	C 8	N 1	O 6	0	0
6	I	1	Total 15	C 8	N 1	O 6	0	0
6	J	1	Total 15	C 8	N 1	O 6	0	0

- Molecule 7 is alpha-D-mannopyranose (three-letter code: MAN) (formula: $C_6H_{12}O_6$).

MAN
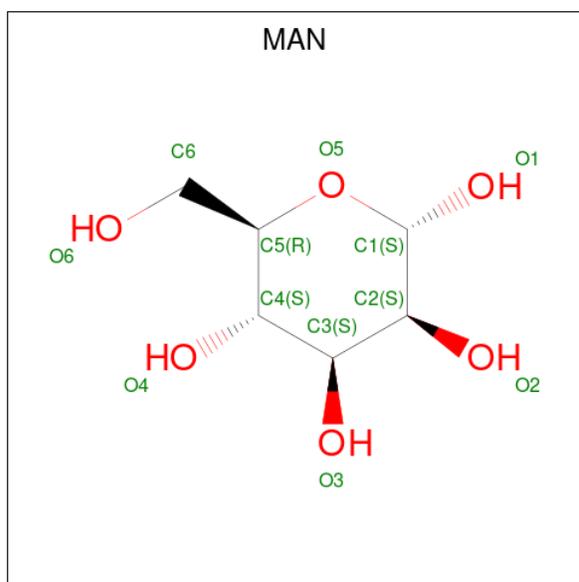
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	B	1	Total 12	C 6	O 6	0	0

- Molecule 8 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	B	1	Total 1	Ca 1	0	0
8	C	1	Total 1	Ca 1	0	0
8	E	1	Total 1	Ca 1	0	0
8	F	1	Total 1	Ca 1	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: Fibrin alpha/alpha-E chain

Chain A:

- Molecule 1: Fibrin alpha/alpha-E chain

Chain D:

- Molecule 2: Fibrin beta chain

Chain B:

Y422 T423 W424 D425 M426 A427 K428 H429 G430 T431 D432 D433 G434 V435 W436 W437 M438 N439 W440 S443 W444 Y445 S446 R448 K449 S451 M452 K453 I454 R455 P456 F457 PHE PRO GLN GLN

• Molecule 2: Fibrin beta chain

Chain E: 32%   52%   8%   •   6%

ASP ASN GLU ASN VAL VAL ASN GLU TYR SER SER GLU LEU GLU LYS HIS GLN I151 Y152 I153 D154 E155 T156 V157 N158 I161 P162 T163 N164 L165 R166 V167 L168 R169 S170 I171 L172 E173 N174 L175 S177 K178 I179 Q180 K181 L182 E183 S184 D185 V186 S187 A188 Q189 M190 E191 Y192 C193 R194

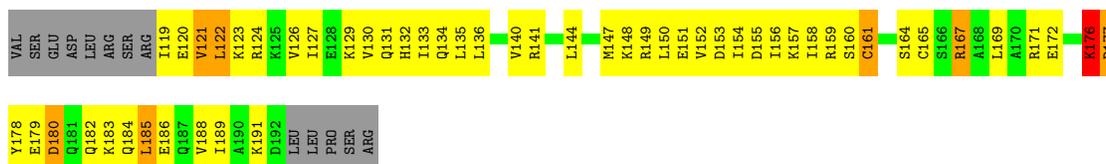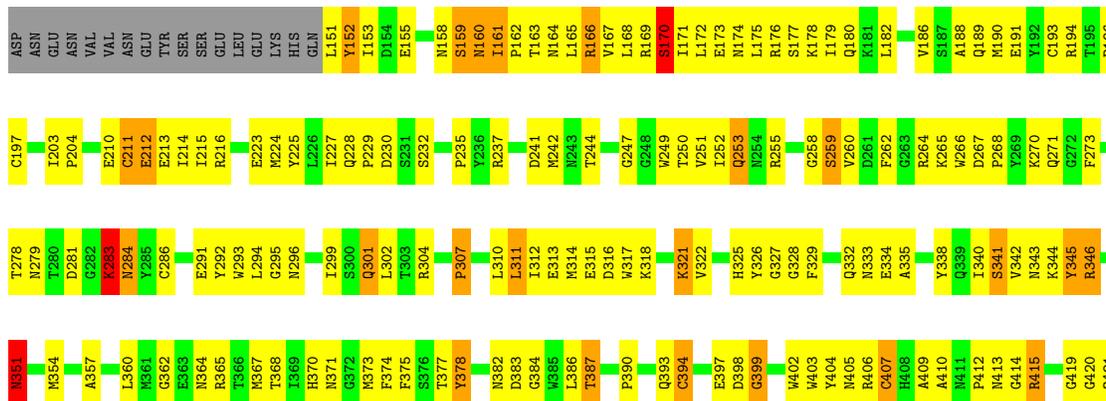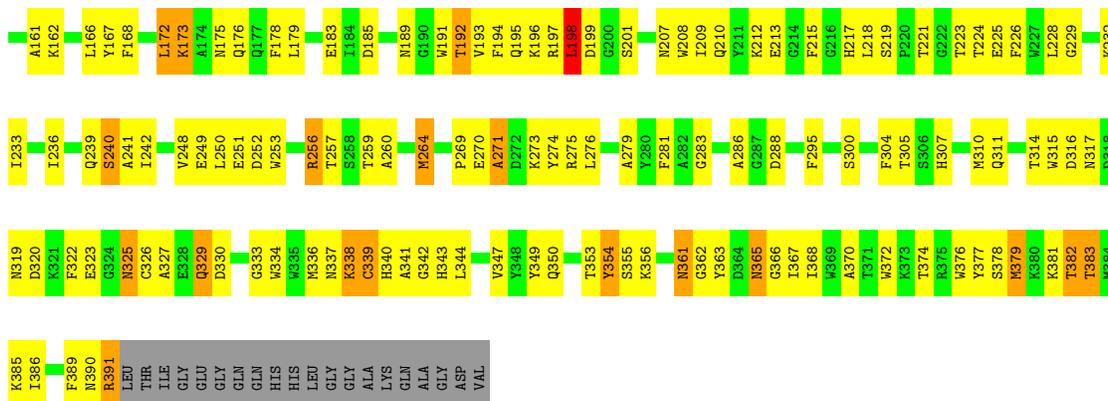T195 P196 C197 T198 V199 I203 P204 V205 E210 C211 E212 E213 I214 I215 R216 K217 E223 M224 Y225 L226 I227 Q228 P229 D230 S231 S232 P235 Y236 R237 D241 M242 N243 T244 G247 Q248 W249 T250 V251 I252 Q253 N254 R255 G258 S259 V260 D261 F262 G263 R264 K265 W266 D267 P268

Y269 K270 Q271 G272 F273 V276 A277 T278 D281 G282 K283 N284 E291 Y292 W293 L294 G295 N296 I299 S300 Q301 L302 T303 R304 P307 L310 L311 I312 E313 M314 E315 D316 W317 K318 K321 V322 H325 Y326 G327 G328 F329 T330 V331 Q332 N333 E334 A335 Y338 Q339 I340 S341

V342 N343 K344 Y345 R346 N351 M354 A357 L360 M361 G362 E363 N364 R365 T366 M367 T368 M373 F374 F375 S376 T377 Y378 N382 D383 G384 W385 L386 T387 P390 Q393 C394 E397 D398 G399 W402 Y403 N405 R406 C407 H408 A409 A410 N411 P412 N413 G414 R415

G419 G420 Q421 Y422 T423 W424 D425 M426 A427 K428 H429 G430 T431 D432 D433 G434 V435 W436 W437 M438 N439 W440 S443 W444 Y445 S446 M447 R448 K449 M450 S451 M452 K453 I454 R455 P456 F457 PHE PRO GLN GLN

• Molecule 3: Fibrin gamma chain

Chain C: 39%   45%   7%   9%

LYS MET LEU GLU GLU ILE MET LYS TYR E97 I100 L101 T102 H103 S106 I107 R108 Y109 L110 Q111 E112 I113 Y114 N115 S116 N117 N118 Q119 K120 I121 V122 N123 L124 K125 E126 K127 V128 A129 Q130 Q136 E137 P138 C139 K140 T149 G150 C153 Q154 D155 I156 A157 N158 A161 K162

L166 Y167 F168 L172 K173 A174 N175 F178 L179 E183 I184 D185 N189 G190 W191 T192 V193 F194 Q195 K196 R197 L198 D199 G200 S201 V202 D203 N207 W208 I209 Q210 Y211 K212 G216 H217 L218 S219 T224 E225 F226 W227 L228 G229 K232 I233 I236 Q239 S240 A241

I242 V248 E249 L250 E251 D252 W253 N254 G255 R256 T257 S258 T259 A260 D261 M264 P269 E270 A271 D272 K273 Y274 R275 L276 T277 Y278 A279 Y280 F281 A282 G283 D284 D285 A286 G287 D288 F295 S300 F304 T305 S306 H307 N308 G309 M310 Q311 T314 W315 D316 N317 D318 N319 D320

K321 F322 E323 G324 N325 C326 A327 E328 Q329 D330 G333 W334 W335 M336 N337 K338 C339 H340 A341 G342 H343 L344 N345 G346 Q350 T353 Y354 S355 K356 N361 G362 Y363 D364 N365 G366 I367 I368 W369 A370 T371 W372 K373 T374 R375 W376 Y377 S378 M379 K380 K381 T382 T383 M384 K385 I386

F389 N390 R391 LEU THR ILE GLY GLU GLY GLN GLN HIS HIS LEU GLY GLY ALA LYS GLN ALA GLY ASP VAL

• Molecule 3: Fibrin gamma chain

Chain F: 40%   44%   7%   9%

LYS MET LEU GLU GLU ILE MET LYS TYR E97 I100 H103 D104 S105 S106 I107 R108 Y109 L110 Q111 E112 I113 Y114 N115 S116 N117 N118 Q119 K120 I121 V122 N123 L124 K125 E126 K127 V128 A129 Q130 L131 E132 A133 Q136 E137 K140 D141 T149 G150 C153 Q154 D155 I156 A157 N158

A161 K162 L166 Y167 F168 L172 K173 A174 N175 Q176 Q177 F178 L179 E183 I184 D185 N189 G190 W191 T192 V193 F194 Q195 K196 R197 L198 D199 G200 S201 N207 W208 Q210 Y211 K212 E213 G214 F215 G216 H217 L218 S219 P220 T221 G222 T223 T224 E225 F226 W227 L228 G229 K232

I233 I236 Q239 S240 A241 I242 V248 E249 L250 E251 D252 W253 R256 T257 S258 T259 A260 M264 P269 E270 A271 D272 K273 Y274 R275 L276 A279 Y280 F281 A282 G283 A286 G287 D288 F295 S300 F304 T305 S306 H307 M310 Q311 T314 W315 D316 N317 D318

N319 D320 K321 F322 E323 G324 N325 C326 A327 E328 Q329 D330 G333 W334 W335 M336 N337 K338 C339 H340 A341 G342 H343 L344 V347 Y348 Q349 Q350 T353 Y354 S355 K356 N361 G362 Y363 D364 N365 G366 I367 I368 W369 A370 T371 W372 K373 T374 R375 W376 Y377 S378 M379 K380 K381 T382 T383 M384

K385 I386 F389 N390 R391 LEU THR ILE GLY GLU GLY GLN GLN HIS HIS LEU GLY GLY ALA LYS GLN ALA GLY ASP VAL

• Molecule 4: fibrin alpha chain peptide ligand fragment Gly-Pro-Arg

Chain G:　　　　　100%

G1 P2 R3

• Molecule 4: fibrin alpha chain peptide ligand fragment Gly-Pro-Arg

Chain H:　　　67%　　　33%

G1 P2 R3

• Molecule 5: fibrin beta chain peptide ligand fragment Gly-His-Arg-Pro-Leu-Asp-Lys

Chain I:　　　57%　　　43%

G1 H2 R3 P4 LEU ASP LYS

• Molecule 5: fibrin beta chain peptide ligand fragment Gly-His-Arg-Pro-Leu-Asp-Lys

Chain J:　　　57%　　　43%

G1 H2 R3 P4 LEU ASP 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 21	Depositor
Cell constants a, b, c, α, β, γ	52.33Å 130.09Å 298.31Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 3.20	Depositor
% Data completeness (in resolution range)	84.0 (20.00-3.20)	Depositor
R_{merge}	0.13	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	CNS 1.0	Depositor
R, R_{free}	0.226 , 0.289	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	11054	wwPDB-VP
Average B, all atoms (Å^2)	71.0	wwPDB-VP

5   Model quality ⓘ

5.1   Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: NDG, MAN, CA

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	0.41	0/609	0.69	0/811
1	D	0.38	0/609	0.64	0/811
2	B	0.38	0/2523	0.70	1/3409 (0.0%)
2	E	0.40	0/2523	0.69	1/3409 (0.0%)
3	C	0.43	0/2429	0.69	2/3285 (0.1%)
3	F	0.44	0/2429	0.69	1/3285 (0.0%)
4	G	0.71	0/23	0.74	0/28
4	H	0.61	0/23	0.76	0/28
5	I	0.55	0/33	0.56	0/43
5	J	0.47	0/33	0.54	0/43
All	All	0.41	0/11234	0.69	5/15152 (0.0%)

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	C	338	LYS	N-CA-C	-5.44	96.30	111.00
3	F	338	LYS	N-CA-C	-5.27	96.78	111.00
2	E	346	ARG	N-CA-C	-5.26	96.79	111.00
2	B	346	ARG	N-CA-C	-5.14	97.13	111.00
3	C	102	THR	N-CA-C	-5.01	97.46	111.00

There are no chirality outliers.

There are no planarity outliers.

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	608	0	649	62	0
1	D	608	0	649	69	0
2	B	2462	0	2328	250	0
2	E	2462	0	2328	261	0
3	C	2364	0	2208	194	0
3	F	2364	0	2208	194	0
4	G	23	0	25	5	0
4	H	23	0	25	7	0
5	I	32	0	32	5	0
5	J	32	0	32	5	0
6	B	15	0	12	9	0
6	E	15	0	12	4	0
6	I	15	0	12	4	0
6	J	15	0	12	0	0
7	B	12	0	12	2	0
8	B	1	0	0	0	0
8	C	1	0	0	0	0
8	E	1	0	0	0	0
8	F	1	0	0	0	0
All	All	11054	0	10544	976	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 45.

The worst 5 of 976 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)
3:F:365:ASN:HD22	3:F:365:ASN:H	1.03	1.02
3:C:326:CYS:HB3	3:C:336:MET:HE2	1.42	0.97
1:D:188:VAL:HG21	2:E:167:VAL:HG21	1.46	0.96
2:B:166:ARG:HH11	2:B:166:ARG:HB2	1.31	0.95
2:E:398:ASP:HA	2:E:433:ASP:HB3	1.48	0.95

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	
1	A	72/87 (83%)	51 (71%)	18 (25%)	3 (4%)	3	20
1	D	72/87 (83%)	44 (61%)	23 (32%)	5 (7%)	1	8
2	B	305/328 (93%)	232 (76%)	50 (16%)	23 (8%)	1	7
2	E	305/328 (93%)	228 (75%)	54 (18%)	23 (8%)	1	7
3	C	293/324 (90%)	230 (78%)	46 (16%)	17 (6%)	1	13
3	F	293/324 (90%)	235 (80%)	42 (14%)	16 (6%)	2	14
4	G	1/3 (33%)	0	1 (100%)	0	100	100
4	H	1/3 (33%)	0	1 (100%)	0	100	100
5	I	2/7 (29%)	2 (100%)	0	0	100	100
5	J	2/7 (29%)	2 (100%)	0	0	100	100
All	All	1346/1498 (90%)	1024 (76%)	235 (18%)	87 (6%)	1	10

5 of 87 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	121	VAL
1	A	145	VAL
2	B	152	TYR
2	B	159	SER
2	B	160	ASN

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	69/82 (84%)	62 (90%)	7 (10%)	7	29
1	D	69/82 (84%)	60 (87%)	9 (13%)	4	19
2	B	265/286 (93%)	247 (93%)	18 (7%)	16	49
2	E	265/286 (93%)	247 (93%)	18 (7%)	16	49
3	C	248/270 (92%)	229 (92%)	19 (8%)	13	44
3	F	248/270 (92%)	229 (92%)	19 (8%)	13	44
4	G	2/2 (100%)	2 (100%)	0	100	100
4	H	2/2 (100%)	1 (50%)	1 (50%)	0	0
5	I	3/6 (50%)	3 (100%)	0	100	100
5	J	3/6 (50%)	3 (100%)	0	100	100
All	All	1174/1292 (91%)	1083 (92%)	91 (8%)	12	43

5 of 91 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	E	253	GLN
3	F	113	ILE
2	E	281	ASP
2	E	351	ASN
3	F	192	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 73 such sidechains are listed below:

Mol	Chain	Res	Type
3	F	111	GLN
3	F	340	HIS
3	F	118	ASN
3	F	230	ASN
3	C	144	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 ⓘ

Of 9 ligands modelled in this entry, 4 are monoatomic - leaving 5 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	#$|Z| > 2$
6	NDG	E	570	-	15,15,15	0.43	0	21,21,21	0.51	0
6	NDG	J	571	-	15,15,15	0.59	0	21,21,21	0.54	0
7	MAN	B	472	-	12,12,12	0.49	0	17,17,17	0.35	0
6	NDG	I	471	-	15,15,15	0.48	0	21,21,21	0.53	0
6	NDG	B	470	-	15,15,15	0.61	0	21,21,21	0.99	1 (4%)

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
6	NDG	E	570	-	-	6/6/26/26	0/1/1/1
6	NDG	J	571	-	-	3/6/26/26	0/1/1/1
7	MAN	B	472	-	-	2/2/22/22	0/1/1/1
6	NDG	I	471	-	-	2/6/26/26	0/1/1/1
6	NDG	B	470	-	-	4/6/26/26	0/1/1/1

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
6	B	470	NDG	C1-C2-C3	-2.52	107.11	110.54

There are no chirality outliers.

5 of 17 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	B	470	NDG	C8-C7-N2-C2
6	B	470	NDG	O7-C7-N2-C2
6	E	570	NDG	C1-C2-N2-C7
6	E	570	NDG	C8-C7-N2-C2
6	E	570	NDG	O7-C7-N2-C2

There are no ring outliers.

4 monomers are involved in 15 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	E	570	NDG	4	0
7	B	472	MAN	2	0
6	I	471	NDG	4	0
6	B	470	NDG	9	0

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.