



wwPDB EM Validation Summary Report ⓘ

Jun 15, 2025 – 12:54 AM JST

PDB ID : 9IK8 / pdb_00009ik8
EMDB ID : EMD-60650
Title : Cryo-EM Structure of SSTR1-Gi SST analogs complex
Authors : Wong, T.S.; Zeng, Z.C.; Xiong, T.T.; Gan, S.Y.; Du, Y.
Deposited on : 2024-06-26
Resolution : 2.82 Å(reported)

This is a wwPDB EM Validation Summary Report for a publicly released PDB entry.

We welcome your comments at 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.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

EMDB validation analysis : **FAILED**
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4-5-2 with Phenix2.0rc1
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : **FAILED**
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.43.1

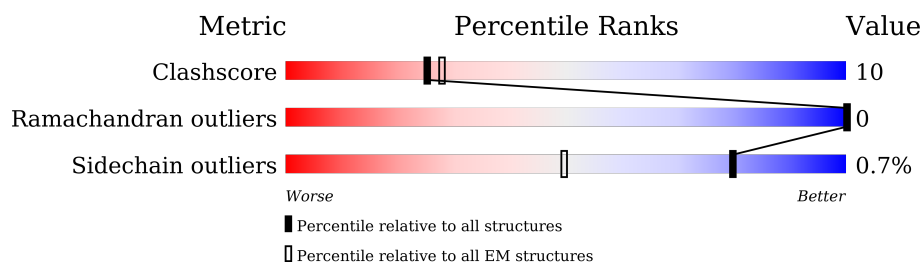
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 2.82 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	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 $\leq 5\%$.

Mol	Chain	Length	Quality of chain
1	D	393	
2	E	338	
3	B	373	
4	C	71	
5	A	350	
6	F	6	

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	TY5	F	3	-	-	X	-
6	004	F	6	-	-	X	-

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 16815 atoms, of which 8318 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 Somatostatin receptor type 1.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
1	D	274	4358	1409	2237	348	342	22	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	392	LEU	-	expression tag	UNP P30872
D	393	GLU	-	expression tag	UNP P30872

- Molecule 2 is a protein called scFv16.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
2	E	232	3416	1116	1668	295	328	9	0	0

- Molecule 3 is a protein called Guanine nucleotide-binding protein G(I)/G(S)/G(T) subunit beta-1.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
3	B	336	4912	1563	2389	450	491	19	0	0

There are 34 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-21	MET	-	initiating methionine	UNP P62873
B	-20	HIS	-	expression tag	UNP P62873
B	-19	HIS	-	expression tag	UNP P62873
B	-18	HIS	-	expression tag	UNP P62873
B	-17	HIS	-	expression tag	UNP P62873
B	-16	HIS	-	expression tag	UNP P62873
B	-15	HIS	-	expression tag	UNP P62873
B	-14	HIS	-	expression tag	UNP P62873

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-13	HIS	-	expression tag	UNP P62873
B	-12	HIS	-	expression tag	UNP P62873
B	-11	HIS	-	expression tag	UNP P62873
B	-10	LEU	-	expression tag	UNP P62873
B	-9	GLU	-	expression tag	UNP P62873
B	-8	VAL	-	expression tag	UNP P62873
B	-7	LEU	-	expression tag	UNP P62873
B	-6	PHE	-	expression tag	UNP P62873
B	-5	GLN	-	expression tag	UNP P62873
B	-4	GLY	-	expression tag	UNP P62873
B	-3	PRO	-	expression tag	UNP P62873
B	-2	GLY	-	expression tag	UNP P62873
B	-1	SER	-	expression tag	UNP P62873
B	0	SER	-	expression tag	UNP P62873
B	1	GLY	-	expression tag	UNP P62873
B	341	VAL	-	expression tag	UNP P62873
B	342	SER	-	expression tag	UNP P62873
B	343	GLY	-	expression tag	UNP P62873
B	344	TRP	-	expression tag	UNP P62873
B	345	ARG	-	expression tag	UNP P62873
B	346	LEU	-	expression tag	UNP P62873
B	347	PHE	-	expression tag	UNP P62873
B	348	LYS	-	expression tag	UNP P62873
B	349	LYS	-	expression tag	UNP P62873
B	350	ILE	-	expression tag	UNP P62873
B	351	SER	-	expression tag	UNP P62873

- Molecule 4 is a protein called Guanine nucleotide-binding protein G(I)/G(S)/G(O) subunit gamma-2.

Mol	Chain	Residues	Atoms						AltConf	Trace
4	C	53	Total	C	H	N	O	S	0	0
			749	241	372	66	67	3		

- Molecule 5 is a protein called Guanine nucleotide-binding protein G(i) subunit alpha-1.

Mol	Chain	Residues	Atoms						AltConf	Trace
5	A	215	Total	C	H	N	O	S	0	0
			3237	1058	1586	284	297	12		

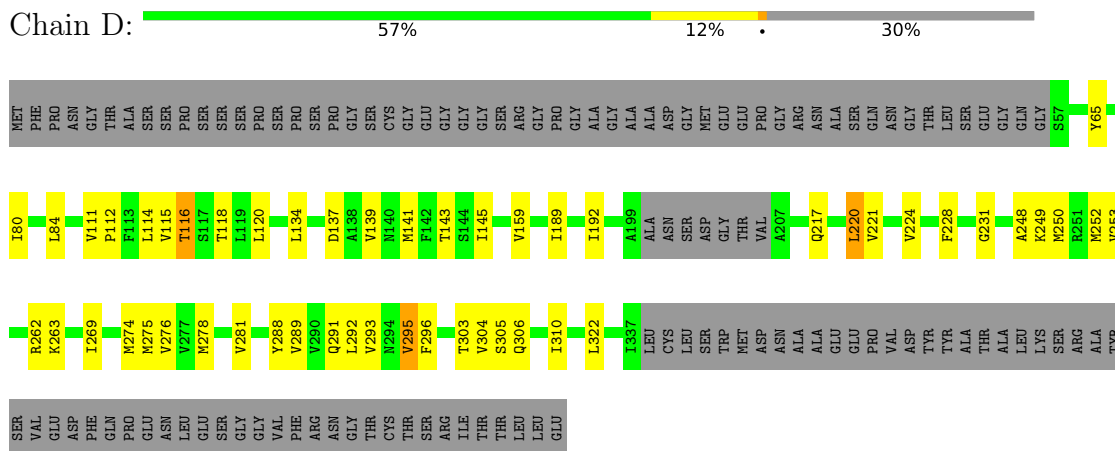
- Molecule 6 is a protein called DTR-LYS-TY5-PHA-A1D5E-004.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	F	6	Total	C	H	N	O	0	0
			143	58	66	10	9		

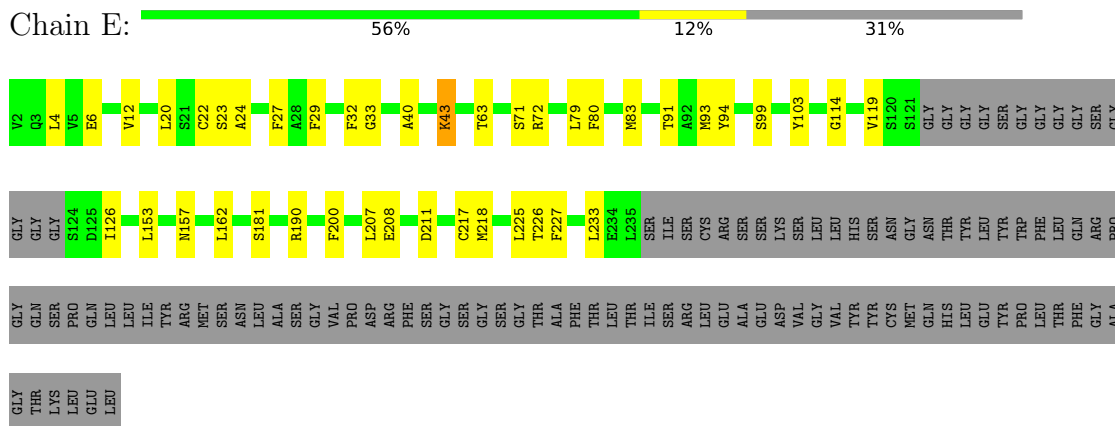
3 Residue-property plots

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.

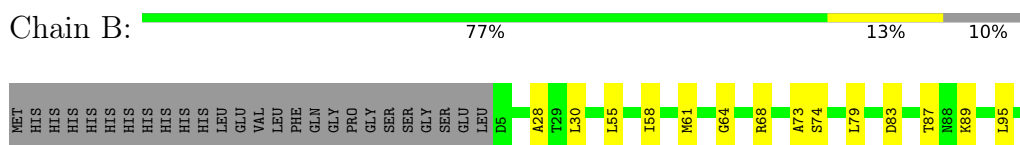
• Molecule 1: Somatostatin receptor type 1

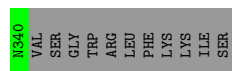


• Molecule 2: scFv16



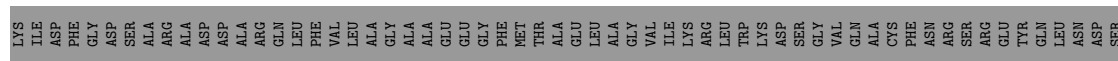
• Molecule 3: Guanine nucleotide-binding protein G(I)/G(S)/G(T) subunit beta-1





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|-----|
| MET |
| ALA |
| SER |
| ASN |
| ASN |
| THR |
| ALA |
| SER |
| I9 |
| M21 |
| S31 |
| N59 |
| P60 |
| F61 |
| ARG |
| GLU |
| LYS |
| LYS |
| PHE |
| PHE |
| CYS |
| ALA |
| ILE |
| LEU |

- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| L5 | S6 | D9 | K10 | A11 | D20 | G27 | V34 | E43 | SER | G46 | K46 | S47 | THR | I49 | Q52 | I55 | IIE | HIS | GLU | GLU | ALA | GLY | TYR | SER | GLU | GLU | GLU | CYS | LYS | GLN | TYR | LYS | ALA | VAL | VAL | TYR | SER | ASN | THR | IIE | GLN | SER | IIE | ALA | IIE | ALA | ARG | ALA | MET | GLY | ARG | IFU |
|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|



- | |
|--------|
| W1 |
| K2 |
| Y3 |
| F4 |
| A1D5E5 |
| 0046 |

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	722906	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	53.5	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	1400	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOCONTINUUM (6k x 4k)	Depositor

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: A1D5E, DTR, PHA, TY5, 004

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	D	0.36	1/2165 (0.0%)	0.55	2/2951 (0.1%)
2	E	0.27	0/1792	0.46	0/2434
3	B	0.49	1/2570 (0.0%)	0.57	1/3493 (0.0%)
4	C	0.39	1/383 (0.3%)	0.42	0/522
5	A	0.56	5/1678 (0.3%)	0.60	8/2255 (0.4%)
6	F	1.19	0/8	1.40	0/8
All	All	0.44	8/8596 (0.1%)	0.55	11/11663 (0.1%)

The worst 5 of 8 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	116	THR	C-O	-6.97	1.15	1.24
5	A	9	ASP	CA-C	-5.63	1.45	1.52
5	A	322	HIS	ND1-CE1	5.29	1.37	1.32
5	A	188	HIS	ND1-CE1	5.25	1.37	1.32
5	A	195	HIS	ND1-CE1	5.19	1.37	1.32

The worst 5 of 11 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	295	VAL	CB-CA-C	-8.72	100.55	112.24
5	A	322	HIS	CB-CG-CD2	-6.55	122.68	131.20
5	A	188	HIS	CB-CG-CD2	-6.51	122.74	131.20
5	A	195	HIS	CB-CG-CD2	-6.32	122.99	131.20
3	B	83	ASP	N-CA-C	-6.17	97.66	108.20

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	D	2121	2237	2246	77	0
2	E	1748	1668	1669	30	0
3	B	2523	2389	2389	38	0
4	C	377	372	372	2	0
5	A	1651	1586	1584	34	0
6	F	77	66	53	39	0
All	All	8497	8318	8313	172	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 10.

The worst 5 of 172 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:D:114:LEU:HD12	6:F:3:TY5:C54	1.25	1.58
1:D:114:LEU:CD1	6:F:3:TY5:H54	1.42	1.46
1:D:295:VAL:CG1	6:F:6:004:HD2	1.47	1.42
1:D:114:LEU:HD12	6:F:3:TY5:C55	1.56	1.34
1:D:269:ILE:HD11	5:A:354:PHE:CD1	1.66	1.31

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	D	270/393 (69%)	250 (93%)	20 (7%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	E	228/338 (68%)	220 (96%)	8 (4%)	0	100	100
3	B	334/373 (90%)	317 (95%)	17 (5%)	0	100	100
4	C	51/71 (72%)	51 (100%)	0	0	100	100
5	A	205/350 (59%)	201 (98%)	4 (2%)	0	100	100
6	F	1/6 (17%)	1 (100%)	0	0	100	100
All	All	1089/1531 (71%)	1040 (96%)	49 (4%)	0	100	100

There are no Ramachandran outliers to report.

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 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	D	232/332 (70%)	230 (99%)	2 (1%)	75	92
2	E	184/278 (66%)	181 (98%)	3 (2%)	58	84
3	B	263/312 (84%)	262 (100%)	1 (0%)	89	96
4	C	35/58 (60%)	35 (100%)	0	100	100
5	A	165/302 (55%)	165 (100%)	0	100	100
6	F	1/1 (100%)	1 (100%)	0	100	100
All	All	880/1283 (69%)	874 (99%)	6 (1%)	80	94

5 of 6 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	E	43	LYS
2	E	181	SER
3	B	98	SER
1	D	220	LEU
1	D	159	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	D	306	GLN
3	B	156	GLN
4	C	59	ASN
5	A	269	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

5 non-standard protein/DNA/RNA residues are modelled in this entry.

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	TY5	F	3	6	19,20,21	1.35	3 (15%)	22,25,27	0.91	1 (4%)
6	A1D5E	F	5	6	11,14,15	4.11	5 (45%)	11,17,19	2.44	4 (36%)
6	004	F	6	6	9,10,11	1.07	0	9,12,14	1.79	2 (22%)
6	DTR	F	1	6	13,15,16	1.51	2 (15%)	13,20,22	0.97	1 (7%)
6	PHA	F	4	6	10,11,11	1.06	1 (10%)	10,13,13	0.62	0

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	TY5	F	3	6	-	6/10/11/13	0/2/2/2
6	A1D5E	F	5	6	-	5/8/19/21	0/1/1/1
6	004	F	6	6	-	1/4/6/8	0/1/1/1
6	DTR	F	1	6	-	1/4/6/8	0/2/2/2
6	PHA	F	4	6	-	0/5/6/6	0/1/1/1

The worst 5 of 11 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	F	5	A1D5E	CB-CG	-8.57	1.34	1.52
6	F	5	A1D5E	C72-N74	7.05	1.49	1.34
6	F	5	A1D5E	CB-CA	6.21	1.68	1.54
6	F	5	A1D5E	CD-N	3.46	1.59	1.47
6	F	5	A1D5E	O71-C72	3.11	1.40	1.35

The worst 5 of 8 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	F	5	A1D5E	O71-C72-N74	4.69	119.34	111.11
6	F	6	004	CB-CA-N	-4.49	101.65	112.40
6	F	5	A1D5E	CG-O71-C72	-3.81	111.02	116.48
6	F	5	A1D5E	O73-C72-N74	-3.01	120.35	124.96
6	F	5	A1D5E	O71-C72-O73	-2.80	120.31	124.53

There are no chirality outliers.

5 of 13 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	F	1	DTR	CA-CB-CG-CD1
6	F	3	TY5	C-CA-CB-CG
6	F	3	TY5	N-CA-CB-CG
6	F	5	A1D5E	O71-C72-N74-C75
6	F	5	A1D5E	O73-C72-N74-C75

There are no ring outliers.

4 monomers are involved in 39 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	F	3	TY5	18	0
6	F	6	004	16	0
6	F	1	DTR	3	0
6	F	4	PHA	3	0

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.