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

wwPDB X-ray Structure Validation Summary Report (i)

Sep 3, 2023 – 09:34 PM EDT

PDB ID	:	3SE3
Title	:	human IFNa2-IFNAR ternary complex
Authors	:	Thomas, C.; Garcia, K.C.
Deposited on	:	2011-06-10
Resolution	:	4.00 Å(reported)

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

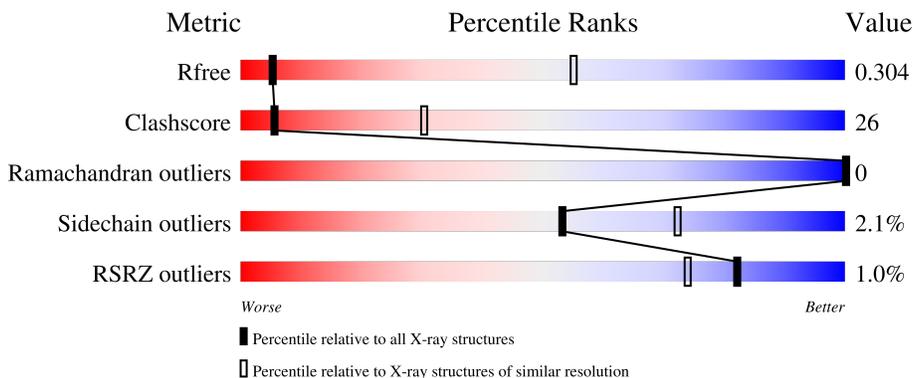|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (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 4.00 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
Rfree		0.304
Clashscore		26
Ramachandran outliers		0
Sidechain outliers		2.1%
RSRZ outliers		1.0%

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))
R_{free}	130704	1087 (4.30-3.70)
Clashscore	141614	1148 (4.30-3.70)
Ramachandran outliers	138981	1108 (4.30-3.70)
Sidechain outliers	138945	1099 (4.30-3.70)
RSRZ outliers	127900	1028 (4.34-3.66)

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% 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.

Mol	Chain	Length	Quality of chain
1	A	414	38% 29% • 31%
2	B	166	57% 19% • 23%
3	C	199	60% 32% 8%

2 Entry composition ⓘ

There are 4 unique types of molecules in this entry. The entry contains 4462 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 Interferon alpha/beta receptor 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	285	2025	1297	336	383	9	0	0	0

There are 5 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-4	ALA	-	cloning artifact	UNP P17181
A	-3	ASP	-	cloning artifact	UNP P17181
A	-2	LEU	-	cloning artifact	UNP P17181
A	-1	GLY	-	cloning artifact	UNP P17181
A	0	SER	-	cloning artifact	UNP P17181

- Molecule 2 is a protein called Interferon alpha 2b.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	128	1006	647	160	192	7	0	0	0

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	57	TYR	HIS	engineered mutation	UNP Q86UP4
B	58	ASN	GLU	engineered mutation	UNP Q86UP4
B	61	SER	GLN	engineered mutation	UNP Q86UP4

- Molecule 3 is a protein called Interferon alpha/beta receptor 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	C	183	1417	912	226	270	9	0	0	0

- Molecule 4 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula:

$C_8H_{15}NO_6$).

NAG

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total 14	C 8	N 1	O 5	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 and electron density. 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. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). 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: Interferon alpha/beta receptor 1

• Molecule 2: Interferon alpha 2b

• Molecule 3: Interferon alpha/beta receptor 2

TYR THR ASP GLU S11 C12 T13 F14 K15 I16 R19 N20 F21 R22 S23 I24 L25 L29 H32 L41 V55 C58 T62 R63 S64 F65 C66 T69 L83 E84 S87 G88 N89 T90 T91 L92 F93 S94 F99 M105 S106 F107 E108 F117 H120 I121

M124 V125 K126 F127 P128 S129 ILE VAL GLU GLU GLU LEU Q136 L139 S140 L141 V142 Q146 S147 I150 V151 K155 P156 GLU ILE LYS GLY ASN M162 S163 G164 N165 Y168 I169 I170 L173 I174 P175 N176 T177 N178 Y179 C180 Y184 H187 S188 D189 E190 Q191 K195

L202 L203 P204 PRO

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 61 2 2	Depositor
Cell constants a, b, c, α, β, γ	93.37Å 93.37Å 401.50Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	46.78 – 4.00 46.78 – 4.00	Depositor EDS
% Data completeness (in resolution range)	99.8 (46.78-4.00) 99.9 (46.78-4.00)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.17	Depositor
$< I/\sigma(I) >$ [1]	2.87 (at 4.00Å)	Xtriage
Refinement program	PHENIX	Depositor
R, R_{free}	0.251 , 0.311 0.249 , 0.304	Depositor DCC
R_{free} test set	477 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å^2)	137.0	Xtriage
Anisotropy	0.001	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 157.8	EDS
L-test for twinning[2]	$< |L| > = 0.45$, $< L^2 > = 0.28$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.90	EDS
Total number of atoms	4462	wwPDB-VP
Average B, all atoms (Å^2)	161.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.02% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5   Model quality ⓘ

5.1   Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: NAG

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	0.47	0/2075	0.88	8/2854 (0.3%)
2	B	0.48	0/1026	0.75	2/1389 (0.1%)
3	C	0.47	0/1452	0.89	3/1980 (0.2%)
All	All	0.47	0/4553	0.86	13/6223 (0.2%)

There are no bond length outliers.

The worst 5 of 13 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	69	VAL	N-CA-CB	-6.40	97.42	111.50
3	C	191	GLN	N-CA-CB	6.21	121.77	110.60
1	A	122	GLY	N-CA-C	-6.18	97.66	113.10
1	A	67	LEU	N-CA-C	5.79	126.62	111.00
1	A	179	LEU	CA-CB-CG	5.75	128.52	115.30

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	2025	0	1671	126	0
2	B	1006	0	931	33	0
3	C	1417	0	1327	60	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	A	14	0	13	4	0
All	All	4462	0	3942	215	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 26.

The worst 5 of 215 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:145:ASN:HD21	4:A:410:NAG:C1	1.39	1.35
3:C:29:LEU:HB3	3:C:32:HIS:HD2	1.22	1.05
1:A:118:HIS:HA	1:A:159:ARG:HG2	1.45	0.98
3:C:19:ARG:HG2	3:C:108:GLU:HG3	1.46	0.96
1:A:18:PHE:CE1	1:A:62:PHE:CE2	2.56	0.93

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	279/414 (67%)	259 (93%)	20 (7%)	0	100	100
2	B	122/166 (74%)	118 (97%)	4 (3%)	0	100	100
3	C	177/199 (89%)	168 (95%)	9 (5%)	0	100	100
All	All	578/779 (74%)	545 (94%)	33 (6%)	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 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	174/382 (46%)	168 (97%)	6 (3%)	37	61
2	B	105/153 (69%)	104 (99%)	1 (1%)	76	86
3	C	158/189 (84%)	156 (99%)	2 (1%)	69	82
All	All	437/724 (60%)	428 (98%)	9 (2%)	53	72

5 of 9 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	C	150	ILE
3	C	189	ASP
1	A	149	VAL
1	A	165	LEU
1	A	300	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 10 such sidechains are listed below:

Mol	Chain	Res	Type
3	C	32	HIS
3	C	122	ASN
3	C	165	ASN
2	B	34	HIS
2	B	90	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 (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

1 ligand is 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	#$|Z| > 2$
4	NAG	A	410	1	14,14,15	0.62	0	17,19,21	1.06	2 (11%)

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	NAG	A	410	1	-	0/6/23/26	0/1/1/1

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	A	410	NAG	C1-O5-C5	-3.13	107.95	112.19
4	A	410	NAG	O5-C1-C2	-2.07	108.03	111.29

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	410	NAG	4	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 ⓘ

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB($Å^2$)	Q<0.9
1	A	285/414 (68%)	-0.10	6 (2%)	63	54	92, 168, 270, 345	0
2	B	128/166 (77%)	-0.41	0	100	100	93, 132, 168, 198	0
3	C	183/199 (91%)	-0.12	0	100	100	104, 153, 208, 264	0
All	All	596/779 (76%)	-0.17	6 (1%)	82	74	92, 154, 246, 345	0

The worst 5 of 6 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	245	ASN	5.1
1	A	84	THR	5.0
1	A	11	VAL	3.1
1	A	85	SER	2.6
1	A	32	VAL	2.5

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

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å²)	Q<0.9
4	NAG	A	410	14/15	0.82	0.21	159,208,221,228	0

6.5 Other polymers ⓘ

There are no such residues in this entry.