



Full wwPDB X-ray Structure Validation Report ⓘ

Sep 28, 2022 – 05:11 PM EDT

PDB ID : 7S1E
Title : Crystal structure of *Cavia porcellus* (guinea pig) importin-alpha 1 in cargo-free state
Authors : Hawker, J.E.; Roby, J.A.; Forwood, J.K.
Deposited on : 2021-09-02
Resolution : 2.35 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

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

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:

MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.31.2
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)	:	2.31.2

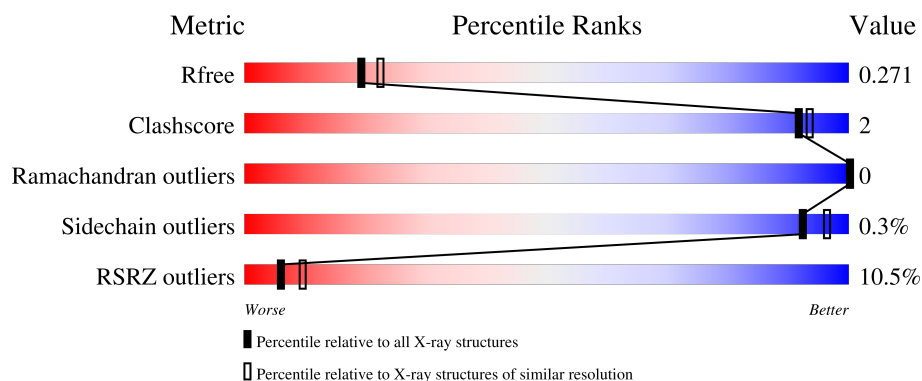
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.35 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))
R_{free}	130704	1164 (2.36-2.36)
Clashscore	141614	1232 (2.36-2.36)
Ramachandran outliers	138981	1211 (2.36-2.36)
Sidechain outliers	138945	1212 (2.36-2.36)
RSRZ outliers	127900	1150 (2.36-2.36)

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 $\leq 5\%$. 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.

Mol	Chain	Length	Quality of chain
1	A	423	<div> <div>11%</div> <div>95%</div> <div>5%</div> </div>
1	B	423	<div> <div>10%</div> <div>96%</div> <div>.</div> </div>

2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 13064 atoms, of which 6606 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.

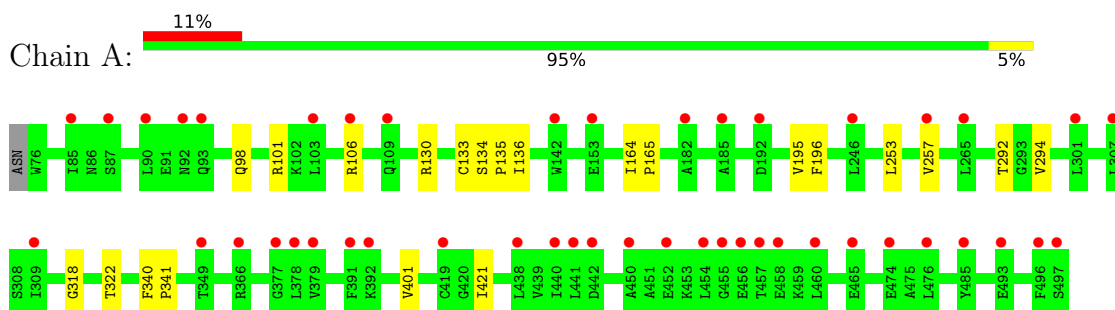
- Molecule 1 is a protein called Importin subunit alpha.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	422	Total	C	H	N	O	S	0	1	0
			6529	2055	3304	545	614	11			
1	B	423	Total	C	H	N	O	S	0	2	0
			6535	2060	3302	544	618	11			

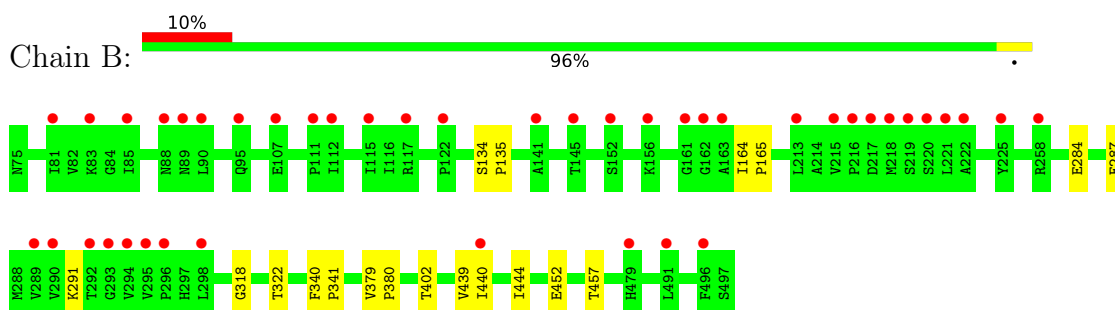
3 Residue-property plots [i](#)

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: Importin subunit alpha



- Molecule 1: Importin subunit alpha



4 Data and refinement statistics

Property	Value	Source
Space group	P 4 21 2	Depositor
Cell constants a, b, c, α , β , γ	184.17Å 184.17Å 57.61Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.41 – 2.35 29.41 – 2.35	Depositor EDS
% Data completeness (in resolution range)	99.9 (29.41-2.35) 99.9 (29.41-2.35)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.70 (at 2.36Å)	Xtriage
Refinement program	REFMAC 1.19.2_4158, PHENIX 1.19.2_4158	Depositor
R, R_{free}	0.235 , 0.266 0.249 , 0.271	Depositor DCC
R_{free} test set	2123 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å ²)	62.5	Xtriage
Anisotropy	0.432	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 49.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	13064	wwPDB-VP
Average B, all atoms (Å ²)	83.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.99% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ 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

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	0/3285	0.44	0/4479
1	B	0.25	0/3296	0.42	0/4495
All	All	0.25	0/6581	0.43	0/8974

There are no bond length outliers.

There are no bond angle outliers.

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	3225	3304	3303	11	0
1	B	3233	3302	3304	10	0
All	All	6458	6606	6607	21	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 2.

All (21) 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:253:LEU:HB3	1:A:292:THR:HG21	1.91	0.53
1:A:257:VAL:HG22	1:A:294:VAL:CG1	2.38	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:318:GLY:O	1:A:322:THR:HG23	2.12	0.49
1:A:340:PHE:N	1:A:341:PRO:CD	2.77	0.48
1:B:284:GLU:N	1:B:284:GLU:OE1	2.47	0.48
1:B:340:PHE:N	1:B:341:PRO:CD	2.78	0.47
1:A:253:LEU:O	1:A:257:VAL:HG23	2.14	0.46
1:A:134:SER:N	1:A:135:PRO:CD	2.78	0.46
1:B:402:THR:HG21	1:B:439:VAL:HG13	1.97	0.46
1:B:318:GLY:O	1:B:322:THR:HG23	2.16	0.44
1:B:287:GLU:O	1:B:291:LYS:HG3	2.18	0.44
1:A:164:ILE:HB	1:A:165:PRO:HD3	2.00	0.43
1:B:452:GLU:HG2	1:B:457:THR:HG21	2.01	0.43
1:A:195:VAL:HG13	1:A:196:PHE:N	2.34	0.42
1:B:379:VAL:HB	1:B:380:PRO:HD3	2.01	0.41
1:A:401:VAL:HG21	1:A:421:ILE:HD11	2.03	0.41
1:B:164:ILE:HB	1:B:165:PRO:HD3	2.02	0.41
1:A:133:CYS:O	1:A:136:ILE:HG22	2.21	0.41
1:B:440:ILE:O	1:B:444:ILE:HG12	2.20	0.41
1:B:134:SER:N	1:B:135:PRO:CD	2.85	0.40
1:A:98:GLN:O	1:A:101:ARG:HG3	2.21	0.40

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	421/423 (100%)	413 (98%)	8 (2%)	0	100	100
1	B	423/423 (100%)	418 (99%)	5 (1%)	0	100	100
All	All	844/846 (100%)	831 (98%)	13 (2%)	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	358/358 (100%)	356 (99%)	2 (1%)	86	93
1	B	359/358 (100%)	359 (100%)	0	100	100
All	All	717/716 (100%)	715 (100%)	2 (0%)	92	96

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	106	ARG
1	A	130	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	352	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 ⓘ

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.

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	422/423 (99%)	0.74	46 (10%) 5 9	52, 72, 103, 116	0
1	B	423/423 (100%)	0.79	43 (10%) 6 11	44, 73, 100, 126	0
All	All	845/846 (99%)	0.76	89 (10%) 6 9	44, 72, 102, 126	0

All (89) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	221	LEU	9.2
1	B	217	ASP	9.2
1	B	218	MET	8.8
1	B	222	ALA	5.8
1	B	219	SER	5.4
1	B	216	PRO	5.2
1	B	88	ASN	5.1
1	A	450	ALA	4.5
1	B	294	VAL	4.3
1	B	215	VAL	4.2
1	A	109	GLN	4.1
1	A	458	GLU	4.1
1	B	112	ILE	3.8
1	B	293	GLY	3.7
1	A	496	PHE	3.7
1	A	265	LEU	3.6
1	A	87	SER	3.6
1	B	162	GLY	3.5
1	A	455	GLY	3.4
1	A	153	GLU	3.3
1	B	220	SER	3.3
1	B	141	ALA	3.3
1	A	457	THR	3.3
1	A	460	LEU	3.2

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Mol	Chain	Res	Type	RSRZ
1	B	81	ILE	3.2
1	B	89	ASN	3.2
1	A	391	PHE	3.1
1	A	90	LEU	3.1
1	A	85	ILE	3.1
1	A	497	SER	3.1
1	B	296	PRO	3.0
1	A	493	GLU	3.0
1	B	152	SER	2.9
1	B	163	ALA	2.9
1	A	309	ILE	2.9
1	A	392	LYS	2.9
1	B	496	PHE	2.9
1	B	145	THR	2.9
1	A	440	ILE	2.8
1	A	452	GLU	2.8
1	A	441	LEU	2.8
1	B	258	ARG	2.8
1	B	117	ARG	2.7
1	A	377	GLY	2.7
1	A	438	LEU	2.7
1	A	419	CYS	2.6
1	B	292	THR	2.6
1	B	213	LEU	2.6
1	B	111	PRO	2.5
1	A	246	LEU	2.5
1	A	465	GLU	2.5
1	B	295	VAL	2.5
1	A	454	LEU	2.5
1	A	474	GLU	2.5
1	A	307	LEU	2.4
1	A	456	GLU	2.4
1	A	485	TYR	2.4
1	B	107	GLU	2.4
1	B	225	TYR	2.3
1	A	192	ASP	2.3
1	B	290	VAL	2.3
1	B	83	LYS	2.3
1	B	122	PRO	2.3
1	A	92	ASN	2.3
1	A	106	ARG	2.3
1	B	289	VAL	2.3

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Mol	Chain	Res	Type	RSRZ
1	B	479	HIS	2.3
1	A	185	ALA	2.3
1	A	378	LEU	2.3
1	B	90	LEU	2.3
1	B	115	ILE	2.3
1	A	349	THR	2.2
1	B	95	GLN	2.2
1	A	257	VAL	2.2
1	B	156	LYS	2.2
1	A	182	ALA	2.2
1	A	93	GLN	2.2
1	B	440	ILE	2.2
1	B	85	ILE	2.2
1	A	142	TRP	2.1
1	A	366	ARG	2.1
1	A	442	ASP	2.1
1	A	476	LEU	2.1
1	B	491	LEU	2.1
1	A	379	VAL	2.1
1	B	298	LEU	2.1
1	B	161	GLY	2.1
1	A	103	LEU	2.0
1	A	301	LEU	2.0

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

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

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

6.4 Ligands [i](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.