



Full wwPDB X-ray Structure Validation Report ⓘ

Nov 13, 2023 – 05:36 PM EST

PDB ID : 8TS8
Title : p85alpha/p110alpha heterodimer H1047R mutant
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Deposited on : 2023-08-11
Resolution : 2.72 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 : 2.36
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) : 2.36

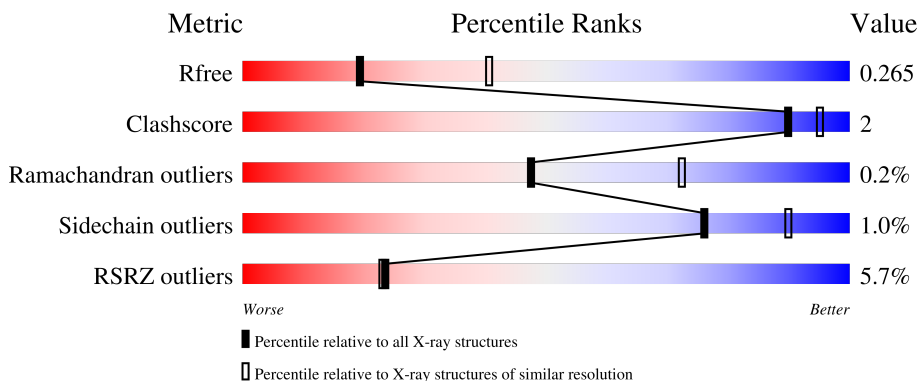
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.72 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	3359 (2.74-2.70)
Clashscore	141614	3686 (2.74-2.70)
Ramachandran outliers	138981	3622 (2.74-2.70)
Sidechain outliers	138945	3623 (2.74-2.70)
RSRZ outliers	127900	3276 (2.74-2.70)

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	1063	 5% 88% 6% 7%
2	B	300	 8% 82% 5% 13%

2 Entry composition [i](#)

There are 2 unique types of molecules in this entry. The entry contains 20722 atoms, of which 10378 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 Phosphatidylinositol 4,5-bisphosphate 3-kinase catalytic subunit alpha isoform.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	A	992	16280	5194	8162	1389	1467	68	32	0	0

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-9	GLY	-	expression tag	UNP P42336
A	-8	SER	-	expression tag	UNP P42336
A	-7	PRO	-	expression tag	UNP P42336
A	-6	GLY	-	expression tag	UNP P42336
A	-5	ILE	-	expression tag	UNP P42336
A	-4	SER	-	expression tag	UNP P42336
A	-3	GLY	-	expression tag	UNP P42336
A	-2	GLY	-	expression tag	UNP P42336
A	-1	GLY	-	expression tag	UNP P42336
A	0	GLY	-	expression tag	UNP P42336
A	1	GLY	-	expression tag	UNP P42336
A	1047	ARG	HIS	engineered mutation	UNP P42336

- Molecule 2 is a protein called Phosphatidylinositol 3-kinase regulatory subunit alpha.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
2	B	262	4442	1397	2216	397	425	7	29	0	0

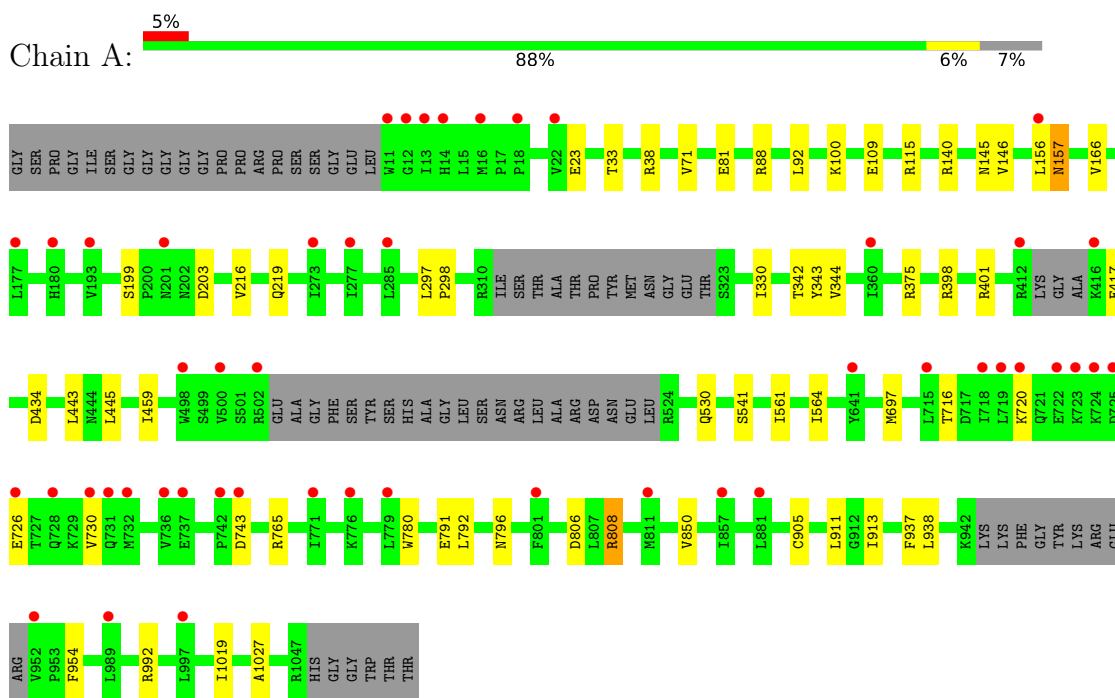
There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	316	GLY	-	expression tag	UNP P27986
B	317	PRO	-	expression tag	UNP P27986

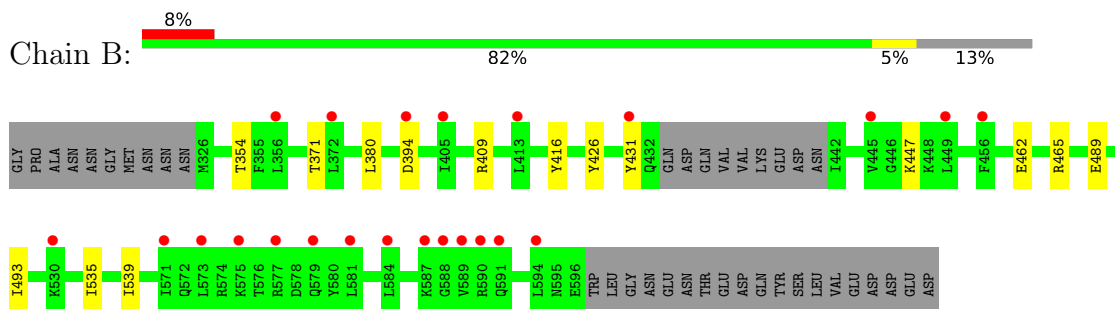
3 Residue-property plots [i](#)

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: Phosphatidylinositol 4,5-bisphosphate 3-kinase catalytic subunit alpha isoform



- Molecule 2: Phosphatidylinositol 3-kinase regulatory subunit alpha



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	85.22Å 121.00Å 191.03Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	95.52 – 2.72 95.52 – 2.72	Depositor EDS
% Data completeness (in resolution range)	93.6 (95.52-2.72) 93.6 (95.52-2.72)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.34 (at 2.73Å)	Xtrriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.225 , 0.265 0.228 , 0.265	Depositor DCC
R_{free} test set	2518 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	65.6	Xtrriage
Anisotropy	0.217	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 44.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	20722	wwPDB-VP
Average B, all atoms (Å ²)	83.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.19% 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 [i](#)

5.1 Standard geometry [i](#)

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	0/8296	0.48	0/11208
2	B	0.24	0/2263	0.50	0/3027
All	All	0.25	0/10559	0.48	0/14235

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 [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	8118	8162	8156	32	0
2	B	2226	2216	2214	6	0
All	All	10344	10378	10370	38	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 (38) 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:992:ARG:NH1	1:A:1027:ALA:O	2.33	0.61
1:A:765:ARG:NH1	1:A:796:ASN:OD1	2.35	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:398:ARG:NH1	1:A:434:ASP:OD1	2.39	0.56
1:A:166:VAL:HG11	1:A:297:LEU:HD22	1.88	0.56
1:A:199:SER:OG	1:A:203:ASP:OD1	2.17	0.52
1:A:109:GLU:N	1:A:109:GLU:OE1	2.43	0.52
1:A:38:ARG:NH2	1:A:743:ASP:OD2	2.40	0.49
1:A:780:TRP:CH2	1:A:850:VAL:HG21	2.47	0.49
1:A:156:LEU:O	1:A:157:ASN:HB2	2.13	0.48
1:A:23:GLU:HG2	1:A:33:THR:HG22	1.94	0.48
1:A:166:VAL:HG11	1:A:297:LEU:CD2	2.43	0.48
1:A:443:LEU:HD22	1:A:445:LEU:HD23	1.96	0.48
1:A:342:THR:O	1:A:344:VAL:N	2.46	0.47
1:A:561:ILE:O	1:A:564:ILE:HG22	2.16	0.46
1:A:806:ASP:OD2	1:A:808:ARG:NH1	2.48	0.46
1:A:71:VAL:HG12	1:A:81:GLU:HA	1.98	0.45
1:A:216:VAL:HG22	1:A:219:GLN:HG3	1.99	0.45
1:A:23:GLU:CG	1:A:33:THR:HG22	2.47	0.44
1:A:459:ILE:HG22	1:A:459:ILE:O	2.17	0.44
1:A:726:GLU:HB3	1:A:730:VAL:HG13	2.00	0.44
2:B:535:ILE:O	2:B:539:ILE:HG23	2.19	0.43
1:A:88:ARG:O	1:A:92:LEU:HD13	2.17	0.43
1:A:791:GLU:HG2	1:A:792:LEU:HD13	2.00	0.43
1:A:911:LEU:HB2	1:A:913:ILE:CD1	2.47	0.43
1:A:905:CYS:HB3	1:A:954:PHE:CZ	2.53	0.43
1:A:937:PHE:CD2	1:A:938:LEU:HG	2.54	0.43
2:B:371:THR:HG22	2:B:380:LEU:CD2	2.49	0.43
1:A:71:VAL:HG23	1:A:100:LYS:HB3	2.01	0.42
1:A:145:ASN:OD1	1:A:146:VAL:N	2.53	0.42
1:A:561:ILE:O	1:A:561:ILE:HG23	2.18	0.42
2:B:489:GLU:O	2:B:493:ILE:HD13	2.20	0.42
1:A:298:PRO:HG2	1:A:697:MET:HG2	2.03	0.41
1:A:330:ILE:N	1:A:330:ILE:HD12	2.36	0.41
2:B:354:THR:HG22	2:B:426:TYR:HB2	2.02	0.41
1:A:1019:ILE:HG22	1:A:1019:ILE:O	2.21	0.41
2:B:462:GLU:OE1	2:B:465:ARG:NH1	2.50	0.40
1:A:375:ARG:NH1	1:A:417:GLU:OE2	2.44	0.40
2:B:394:ASP:OD1	2:B:394:ASP:N	2.54	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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	982/1063 (92%)	946 (96%)	34 (4%)	2 (0%)	47	72
2	B	258/300 (86%)	251 (97%)	7 (3%)	0	100	100
All	All	1240/1363 (91%)	1197 (96%)	41 (3%)	2 (0%)	47	72

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	157	ASN
1	A	343	TYR

5.3.2 Protein sidechains [i](#)

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	912/963 (95%)	904 (99%)	8 (1%)	78	91
2	B	243/277 (88%)	239 (98%)	4 (2%)	62	83
All	All	1155/1240 (93%)	1143 (99%)	12 (1%)	76	90

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	115	ARG
1	A	140	ARG
1	A	401	ARG
1	A	530	GLN

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Mol	Chain	Res	Type
1	A	541	SER
1	A	716	THR
1	A	720	LYS
1	A	808	ARG
2	B	409	ARG
2	B	416	TYR
2	B	431	TYR
2	B	447	LYS

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	917	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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](#)

There are no ligands in this entry.

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

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	992/1063 (93%)	0.59	49 (4%) 29 28	42, 66, 112, 169	3 (0%)
2	B	262/300 (87%)	0.58	23 (8%) 10 8	56, 85, 139, 174	2 (0%)
All	All	1254/1363 (92%)	0.59	72 (5%) 23 23	42, 69, 124, 174	5 (0%)

All (72) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	588	GLY	7.6
1	A	13	ILE	7.5
1	A	12	GLY	6.2
1	A	14	HIS	5.8
1	A	718	ILE	5.1
1	A	726	GLU	4.9
1	A	723	LYS	4.8
1	A	725	ASP	4.6
1	A	416	LYS	4.4
1	A	715	LEU	4.4
2	B	587	LYS	4.1
1	A	771	ILE	4.0
1	A	728	GLN	3.9
1	A	502	ARG	3.9
1	A	11	TRP	3.9
1	A	500	VAL	3.8
2	B	590	ARG	3.7
2	B	591	GLN	3.6
1	A	952	VAL	3.6
2	B	394	ASP	3.5
1	A	720	LYS	3.3
2	B	584	LEU	3.2
1	A	16	MET	3.2
1	A	737	GLU	3.0

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Mol	Chain	Res	Type	RSRZ
1	A	277	ILE	3.0
1	A	180	HIS	3.0
1	A	724	LYS	3.0
1	A	779	LEU	2.9
2	B	581	LEU	2.9
2	B	571	ILE	2.9
1	A	498	TRP	2.8
2	B	594	LEU	2.8
2	B	356	LEU	2.7
1	A	22	VAL	2.7
1	A	193	VAL	2.7
1	A	730	VAL	2.7
1	A	722	GLU	2.6
2	B	575	LYS	2.6
1	A	732	MET	2.6
2	B	431	TYR	2.6
1	A	641	TYR	2.5
2	B	530	LYS	2.5
1	A	989	LEU	2.5
1	A	811	MET	2.5
2	B	449	LEU	2.4
1	A	18	PRO	2.4
1	A	997	LEU	2.4
1	A	285	LEU	2.3
1	A	273	ILE	2.3
2	B	573	LEU	2.3
2	B	445	VAL	2.3
2	B	405	ILE	2.3
2	B	579	GLN	2.3
1	A	719	LEU	2.2
1	A	412	ARG	2.2
2	B	589	VAL	2.2
1	A	881	LEU	2.2
1	A	177	LEU	2.2
1	A	736	VAL	2.2
1	A	857	ILE	2.2
2	B	577	ARG	2.2
1	A	743	ASP	2.2
1	A	801	PHE	2.2
1	A	731	GLN	2.1
1	A	742	PRO	2.1
2	B	456	PHE	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	201	ASN	2.1
1	A	156	LEU	2.0
1	A	360	ILE	2.0
2	B	413	LEU	2.0
1	A	776	LYS	2.0
2	B	372	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.