



Full wwPDB X-ray Structure Validation Report ⓘ

Dec 12, 2023 – 10:42 pm GMT

PDB ID : 4CT5
Title : DDX6
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Deposited on : 2014-03-12
Resolution : 3.00 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
Mogul : 1.8.4, CSD as541be (2020)
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

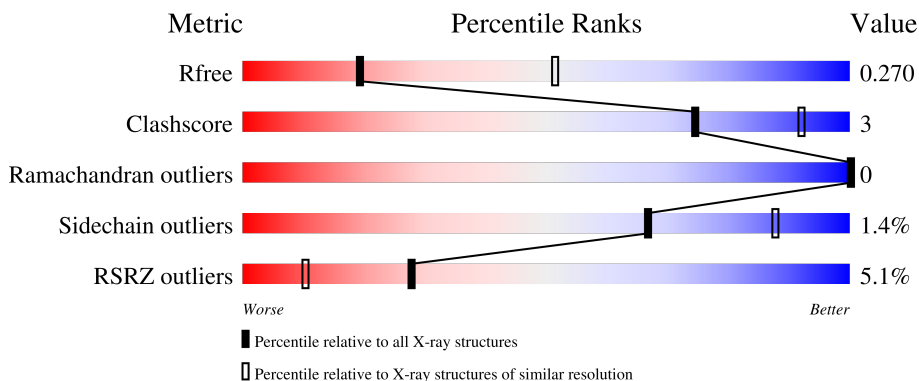
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.00 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	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	2092 (3.00-3.00)
Clashscore	141614	2416 (3.00-3.00)
Ramachandran outliers	138981	2333 (3.00-3.00)
Sidechain outliers	138945	2336 (3.00-3.00)
RSRZ outliers	127900	1990 (3.00-3.00)

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	378	 5% 93% 6% .
1	B	378	 5% 91% 7% ..

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
2	ACT	B	1470	-	-	-	X

2 Entry composition [i](#)

There are 2 unique types of molecules in this entry. The entry contains 11627 atoms, of which 5748 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.

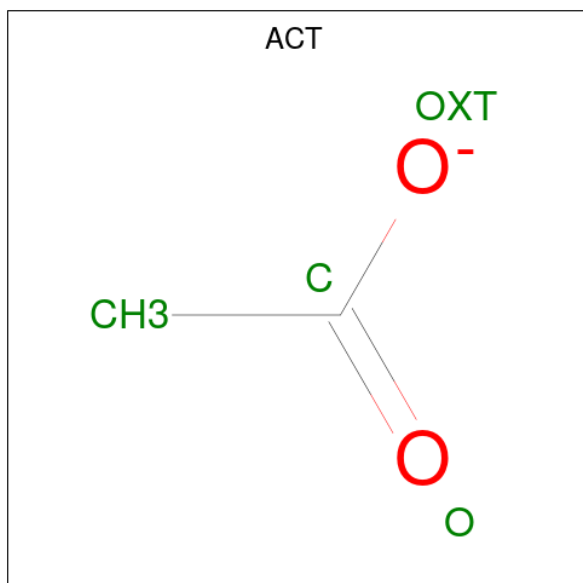
- Molecule 1 is a protein called DDX6.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace	
			Total	C	H	N	O				S
1	A	375	5791	1864	2860	511	538	18	0	0	0
1	B	375	5822	1871	2882	514	538	17	0	0	0

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	92	ARG	-	expression tag	UNP P26196
A	93	SER	-	expression tag	UNP P26196
A	94	MET	-	expression tag	UNP P26196
B	92	ARG	-	expression tag	UNP P26196
B	93	SER	-	expression tag	UNP P26196
B	94	MET	-	expression tag	UNP P26196

- Molecule 2 is ACETATE ION (three-letter code: ACT) (formula: C₂H₃O₂).

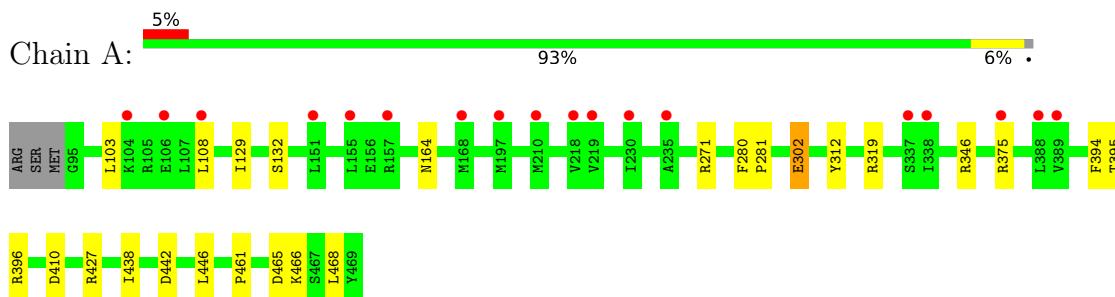


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	H	O	0	0
			7	2	3	2		
2	B	1	Total	C	H	O	0	0
			7	2	3	2		

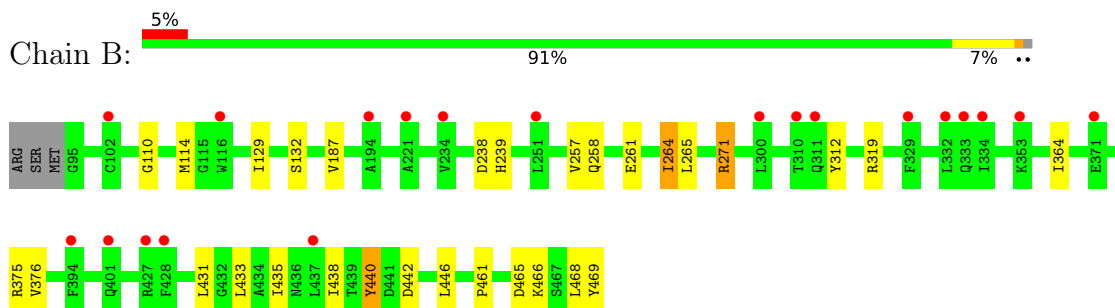
3 Residue-property plots [i](#)

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: DDX6



- Molecule 1: DDX6



4 Data and refinement statistics i

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	113.12Å 113.14Å 77.18Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.59 – 3.00 79.99 – 2.69	Depositor EDS
% Data completeness (in resolution range)	97.5 (50.59-3.00) 98.7 (79.99-2.69)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.48 (at 2.69Å)	Xtrriage
Refinement program	PHENIX (PHENIX.REFINE)	Depositor
R, R_{free}	0.231 , 0.262 0.241 , 0.270	Depositor DCC
R_{free} test set	1389 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	78.5	Xtrriage
Anisotropy	0.575	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.41 , 98.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	0.460 for k,h,-l	Xtrriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	11627	wwPDB-VP
Average B, all atoms (Å ²)	127.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.52% 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](#)

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

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	0.26	0/2979	0.46	0/4031
1	B	0.30	1/2989 (0.0%)	0.47	0/4044
All	All	0.28	1/5968 (0.0%)	0.46	0/8075

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	440	TYR	CD2-CE2	-5.33	1.31	1.39

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	2931	2860	2947	16	0
1	B	2940	2882	2965	22	0
2	A	4	3	3	0	0
2	B	4	3	3	0	0
All	All	5879	5748	5918	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 3.

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:B:466:LYS:H	1:B:466:LYS:HD2	1.41	0.84
1:A:466:LYS:H	1:A:466:LYS:HD2	1.45	0.82
1:B:465:ASP:HB3	1:B:468:LEU:HD12	1.65	0.77
1:A:465:ASP:HB3	1:A:468:LEU:CD1	2.23	0.68
1:A:465:ASP:HB3	1:A:468:LEU:HD12	1.75	0.68
1:B:465:ASP:HB3	1:B:468:LEU:CD1	2.23	0.68
1:A:312:TYR:CE1	1:A:461:PRO:HD3	2.34	0.62
1:B:312:TYR:CE1	1:B:461:PRO:HD3	2.35	0.62
1:B:440:TYR:CD1	1:B:440:TYR:N	2.75	0.54
1:A:129:ILE:O	1:A:132:SER:OG	2.24	0.53
1:A:466:LYS:HD2	1:A:466:LYS:N	2.20	0.53
1:A:394:PHE:O	1:A:395:THR:OG1	2.23	0.49
1:B:440:TYR:N	1:B:440:TYR:HD1	2.10	0.49
1:B:264:ILE:HD13	1:B:271:ARG:HD2	1.95	0.48
1:A:394:PHE:C	1:A:396:ARG:H	2.17	0.48
1:A:103:LEU:HB2	1:A:108:LEU:HD11	1.96	0.48
1:B:271:ARG:NE	1:B:271:ARG:O	2.47	0.47
1:A:346:ARG:NH2	1:A:410:ASP:OD1	2.45	0.47
1:B:438:ILE:HD13	1:B:446:LEU:HB2	1.96	0.46
1:B:110:GLY:HA3	1:B:187:VAL:O	2.15	0.46
1:B:238:ASP:OD1	1:B:239:HIS:ND1	2.50	0.45
1:A:302:GLU:OE1	1:A:427:ARG:NH1	2.50	0.45
1:A:438:ILE:HD13	1:A:446:LEU:HB2	1.99	0.45
1:A:438:ILE:HG23	1:A:442:ASP:HB2	1.99	0.44
1:B:364:ILE:CG2	1:B:376:VAL:HG11	2.48	0.43
1:B:438:ILE:CD1	1:B:446:LEU:HD13	2.50	0.42
1:B:466:LYS:HD2	1:B:466:LYS:N	2.20	0.42
1:B:261:GLU:O	1:B:265:LEU:HG	2.19	0.42
1:B:264:ILE:O	1:B:264:ILE:HD12	2.20	0.41
1:A:438:ILE:CD1	1:A:446:LEU:HD13	2.50	0.41
1:B:433:LEU:CD1	1:B:435:ILE:HG13	2.51	0.41
1:A:280:PHE:N	1:A:281:PRO:HD3	2.36	0.41
1:B:257:VAL:HG13	1:B:258:GLN:N	2.36	0.41
1:B:431:LEU:O	1:B:469:TYR:HA	2.18	0.41
1:A:103:LEU:HB2	1:A:108:LEU:CD1	2.51	0.41
1:B:129:ILE:O	1:B:132:SER:OG	2.34	0.41
1:B:110:GLY:O	1:B:114:MET:HG2	2.21	0.41
1:B:438:ILE:HG23	1:B:442:ASP:HB2	2.02	0.41

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	373/378 (99%)	356 (95%)	17 (5%)	0	100	100
1	B	373/378 (99%)	357 (96%)	16 (4%)	0	100	100
All	All	746/756 (99%)	713 (96%)	33 (4%)	0	100	100

There are no Ramachandran outliers to report.

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	318/338 (94%)	313 (98%)	5 (2%)	62	86
1	B	320/338 (95%)	316 (99%)	4 (1%)	69	89
All	All	638/676 (94%)	629 (99%)	9 (1%)	67	88

All (9) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	164	ASN
1	A	271	ARG
1	A	302	GLU
1	A	319	ARG
1	A	375	ARG
1	B	264	ILE
1	B	271	ARG
1	B	319	ARG

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Mol	Chain	Res	Type
1	B	375	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	285	GLN

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](#)

2 ligands 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	$\# Z > 2$
2	ACT	A	1470	-	3,3,3	0.75	0	3,3,3	1.39	0
2	ACT	B	1470	-	3,3,3	0.77	0	3,3,3	1.30	0

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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	375/378 (99%)	0.08	18 (4%) 30 11	77, 113, 158, 194	0
1	B	375/378 (99%)	0.25	20 (5%) 26 10	75, 114, 159, 220	0
All	All	750/756 (99%)	0.16	38 (5%) 28 10	75, 114, 159, 220	0

All (38) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	334	ILE	5.3
1	B	221	ALA	5.0
1	A	157	ARG	5.0
1	B	234	VAL	4.7
1	B	194	ALA	4.7
1	A	235	ALA	4.5
1	A	230	ILE	4.1
1	A	337	SER	3.9
1	B	394	PHE	3.9
1	A	388	LEU	3.8
1	A	197	MET	3.8
1	A	104	LYS	3.6
1	A	151	LEU	3.5
1	B	116	TRP	3.3
1	A	389	VAL	3.2
1	B	311	GLN	3.2
1	A	106	GLU	3.2
1	A	168	MET	3.1
1	A	219	VAL	2.9
1	B	427	ARG	2.9
1	B	437	LEU	2.7
1	A	155	LEU	2.6
1	B	401	GLN	2.5
1	B	251	LEU	2.5

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Mol	Chain	Res	Type	RSRZ
1	B	428	PHE	2.5
1	B	329	PHE	2.4
1	B	102	CYS	2.4
1	B	333	GLN	2.3
1	A	218	VAL	2.3
1	B	300	LEU	2.2
1	A	375	ARG	2.2
1	B	332	LEU	2.2
1	A	210	MET	2.1
1	B	310	THR	2.1
1	B	371	GLU	2.0
1	B	353	LYS	2.0
1	A	108	LEU	2.0
1	A	338	ILE	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](#)

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(Å ²)	Q<0.9
2	ACT	B	1470	4/4	0.68	0.89	120,132,145,145	0
2	ACT	A	1470	4/4	0.89	0.23	123,126,159,159	0

6.5 Other polymers [i](#)

There are no such residues in this entry.