



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 07:04 AM UTC

PDB ID : 7JUM / pdb_00007jum
Title : Pfs230 D1 domain in complex with neutralizing antibody LMIV230-01
Authors : Tolia, N.; Tang, W.K.
Deposited on : 2020-08-20
Resolution : 2.00 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	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

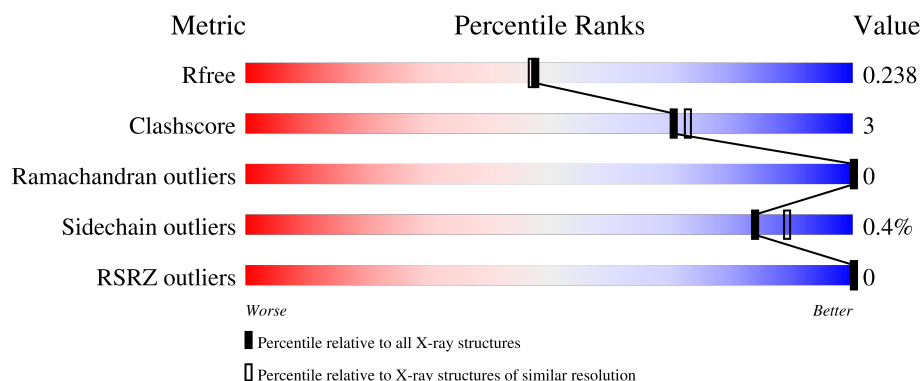
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

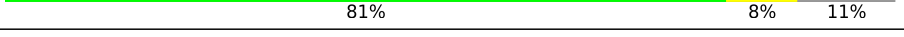
The reported resolution of this entry is 2.00 Å.

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}	180053	10052 (2.00-2.00)
Clashscore	190562	11152 (2.00-2.00)
Ramachandran outliers	187476	11031 (2.00-2.00)
Sidechain outliers	187428	11029 (2.00-2.00)
RSRZ outliers	180081	10067 (2.00-2.00)

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	195	
1	B	195	
1	C	195	
2	H	257	
2	I	257	

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Mol	Chain	Length	Quality of chain
2	J	257	81% 7% 12%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 10521 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 Gametocyte surface protein P230.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	176	Total	C	N	O	S	0	1	0
			1413	905	219	285	4			
1	B	174	Total	C	N	O	S	0	0	0
			1391	891	216	280	4			
1	C	172	Total	C	N	O	S	0	0	0
			1374	881	213	276	4			

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	585	GLN	ASN	conflict	UNP P68874
B	585	GLN	ASN	conflict	UNP P68874
C	585	GLN	ASN	conflict	UNP P68874

- Molecule 2 is a protein called Neutralizing antibody, LMIV230-01 Single-chain Fv.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	H	228	Total	C	N	O	S	0	0	0
			1751	1108	298	338	7			
2	I	230	Total	C	N	O	S	0	0	0
			1759	1112	300	340	7			
2	J	227	Total	C	N	O	S	0	0	0
			1747	1106	297	337	7			

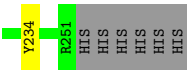
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	191	Total	O	0	0
			191	191		
3	B	177	Total	O	0	0
			177	177		

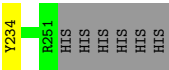
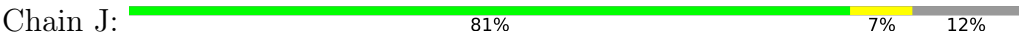
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	C	114	Total 114	O 114	0	0
3	H	240	Total 240	O 240	0	0
3	I	227	Total 227	O 227	0	0
3	J	137	Total 137	O 137	0	0



- Molecule 2: Neutralizing antibody, LMIV230-01 Single-chain Fv



4 Data and refinement statistics

Property	Value	Source
Space group	P 31	Depositor
Cell constants a, b, c, α , β , γ	144.02Å 144.02Å 54.53Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	19.74 – 2.00 19.74 – 2.00	Depositor EDS
% Data completeness (in resolution range)	99.2 (19.74-2.00) 99.3 (19.74-2.00)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.45 (at 2.01Å)	Xtriage
Refinement program	REFMAC 5.8.0258	Depositor
R, R_{free}	0.191 , 0.233 0.198 , 0.238	Depositor DCC
R_{free} test set	4252 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	30.3	Xtriage
Anisotropy	0.055	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 33.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.268 for -h,-k,l 0.026 for h,-h-k,-l 0.023 for -k,-h,-l	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	10521	wwPDB-VP
Average B, all atoms (Å ²)	34.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.51% 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	1.02	0/1442	1.17	0/1950
1	B	1.02	1/1417 (0.1%)	1.15	0/1916
1	C	1.02	0/1400	1.15	0/1894
2	H	1.01	0/1790	1.22	0/2423
2	I	1.01	0/1798	1.23	0/2433
2	J	1.03	0/1786	1.23	0/2418
All	All	1.02	1/9633 (0.0%)	1.19	0/13034

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	713	ASP	C-O	5.26	1.30	1.23

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	1413	0	1424	8	0
1	B	1391	0	1401	8	0
1	C	1374	0	1384	7	0
2	H	1751	0	1727	15	0
2	I	1759	0	1733	17	0
2	J	1747	0	1724	11	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	A	191	0	0	7	0
3	B	177	0	0	7	0
3	C	114	0	0	2	0
3	H	240	0	0	2	0
3	I	227	0	0	3	0
3	J	137	0	0	2	0
All	All	10521	0	9393	63	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 (63) 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)
3:A:805:HOH:O	2:H:98:LYS:CE	2.23	0.86
3:A:805:HOH:O	2:H:98:LYS:HE3	1.84	0.74
1:A:717:LYS:HE3	3:A:959:HOH:O	1.91	0.70
2:J:176:LEU:HD22	2:J:214:PHE:CG	2.32	0.65
1:C:588:ASN:HB2	3:C:826:HOH:O	1.98	0.62
2:J:104:VAL:HG13	2:J:234:TYR:CZ	2.35	0.62
2:I:56:ASP:HA	3:I:367:HOH:O	2.01	0.60
2:J:24:VAL:HG12	3:J:302:HOH:O	2.03	0.58
3:B:851:HOH:O	2:I:1:GLN:CB	2.52	0.58
1:B:712:GLU:OE2	2:H:163:THR:HB	2.03	0.57
1:C:581:LYS:NZ	3:C:804:HOH:O	2.38	0.56
2:J:64:PHE:HB3	2:J:68:VAL:HG23	1.87	0.56
2:H:64:PHE:HB3	2:H:68:VAL:HG23	1.87	0.56
2:I:64:PHE:HB3	2:I:68:VAL:HG23	1.88	0.55
1:A:712[A]:GLU:OE2	2:I:163:THR:HB	2.08	0.54
3:A:814:HOH:O	2:H:2:VAL:HG21	2.08	0.54
2:I:3:GLN:HG2	3:I:476:HOH:O	2.07	0.52
1:B:663:LEU:HG	1:B:670:LEU:HD22	1.92	0.52
1:A:663:LEU:HG	1:A:670:LEU:HD22	1.92	0.51
1:A:712[B]:GLU:CD	2:I:154:LEU:HD21	2.37	0.50
2:J:149:GLN:HG2	3:J:336:HOH:O	2.12	0.49
1:B:703:TYR:HA	1:B:723:VAL:O	2.12	0.49
1:A:623:LYS:HE3	1:A:689:GLU:OE2	2.11	0.49
1:A:703:TYR:HA	1:A:723:VAL:O	2.13	0.48
1:C:663:LEU:HG	1:C:670:LEU:HD22	1.95	0.48
2:H:35:ILE:HG12	3:H:410:HOH:O	2.12	0.48
2:I:35:ILE:HG12	3:I:438:HOH:O	2.12	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:607:LYS:NZ	3:B:807:HOH:O	2.42	0.47
2:I:174:SER:O	2:I:193:LYS:HA	2.15	0.47
2:J:68:VAL:HG22	2:J:83:LEU:HD13	1.97	0.47
1:A:581:LYS:NZ	3:A:808:HOH:O	2.45	0.47
1:C:703:TYR:HA	1:C:723:VAL:O	2.15	0.46
2:I:147:MET:HE3	2:I:166:CYS:SG	2.55	0.46
2:I:163:THR:C	2:I:164:LEU:HD12	2.41	0.46
2:J:174:SER:O	2:J:193:LYS:HA	2.16	0.46
3:A:958:HOH:O	2:I:215:THR:HG21	2.16	0.46
1:C:641:TYR:O	1:C:644:LYS:HE2	2.16	0.45
1:C:623:LYS:HE2	1:C:625:ILE:HD11	1.98	0.45
2:H:174:SER:O	2:H:193:LYS:HA	2.16	0.45
1:A:654:GLU:HG3	3:A:922:HOH:O	2.15	0.45
3:B:851:HOH:O	2:I:1:GLN:HB2	2.15	0.45
2:H:147:MET:HE3	2:H:166:CYS:SG	2.56	0.45
1:B:710:LYS:NZ	3:B:816:HOH:O	2.50	0.45
2:J:163:THR:C	2:J:164:LEU:HD12	2.42	0.45
2:H:165:TYR:CD1	2:H:215:THR:HG22	2.52	0.45
2:H:163:THR:C	2:H:164:LEU:HD12	2.41	0.44
2:J:36:TRP:CE2	2:J:81:MET:HB2	2.53	0.44
2:H:18:VAL:O	2:H:82:GLU:HA	2.18	0.43
1:B:728:GLU:HG2	3:B:843:HOH:O	2.18	0.43
2:I:36:TRP:CE2	2:I:81:MET:HB2	2.54	0.43
1:C:623:LYS:CE	1:C:625:ILE:HD11	2.49	0.42
3:B:824:HOH:O	2:I:2:VAL:HG21	2.18	0.42
2:I:18:VAL:O	2:I:82:GLU:HA	2.20	0.42
1:B:728:GLU:CG	3:B:843:HOH:O	2.67	0.42
2:H:36:TRP:CE2	2:H:81:MET:HB2	2.55	0.42
2:H:144:ASP:OD1	3:H:301:HOH:O	2.21	0.41
2:I:104:VAL:HG13	2:I:234:TYR:CZ	2.55	0.41
2:I:165:TYR:CD1	2:I:215:THR:HG22	2.56	0.41
1:B:680:GLU:OE1	1:B:684:LYS:HE2	2.20	0.41
2:J:35:ILE:HD12	2:J:37:VAL:HG23	2.02	0.41
2:H:36:TRP:CD2	2:H:81:MET:HB2	2.56	0.40
2:H:68:VAL:HG22	2:H:83:LEU:HD13	2.03	0.40
2:J:18:VAL:O	2:J:82:GLU:HA	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	175/195 (90%)	169 (97%)	6 (3%)	0	100	100
1	B	172/195 (88%)	167 (97%)	5 (3%)	0	100	100
1	C	170/195 (87%)	165 (97%)	5 (3%)	0	100	100
2	H	224/257 (87%)	216 (96%)	8 (4%)	0	100	100
2	I	226/257 (88%)	218 (96%)	8 (4%)	0	100	100
2	J	223/257 (87%)	218 (98%)	5 (2%)	0	100	100
All	All	1190/1356 (88%)	1153 (97%)	37 (3%)	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	166/180 (92%)	165 (99%)	1 (1%)	78	85
1	B	163/180 (91%)	163 (100%)	0	100	100
1	C	161/180 (89%)	161 (100%)	0	100	100
2	H	188/198 (95%)	187 (100%)	1 (0%)	81	87
2	I	188/198 (95%)	187 (100%)	1 (0%)	81	87
2	J	188/198 (95%)	187 (100%)	1 (0%)	81	87
All	All	1054/1134 (93%)	1050 (100%)	4 (0%)	84	89

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	728	GLU
2	H	176	LEU
2	I	176	LEU
2	J	35	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	677	ASN
1	B	598	GLN
1	C	598	GLN
2	H	39	GLN
2	H	181	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 oligosaccharides 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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	176/195 (90%)	-1.48	0 100 100	15, 27, 46, 80	1 (0%)
1	B	174/195 (89%)	-1.45	0 100 100	20, 28, 50, 76	0
1	C	172/195 (88%)	-1.38	0 100 100	29, 38, 62, 87	0
2	H	228/257 (88%)	-1.40	0 100 100	19, 27, 45, 84	0
2	I	230/257 (89%)	-1.39	0 100 100	20, 28, 48, 72	0
2	J	227/257 (88%)	-1.29	0 100 100	27, 40, 60, 79	0
All	All	1207/1356 (89%)	-1.39	0 100 100	15, 32, 56, 87	1 (0%)

There are no RSRZ outliers to report.

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 oligosaccharides 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.