



Full wwPDB X-ray Structure Validation Report ⓘ

Jun 12, 2024 – 07:36 PM EDT

PDB ID : 1IJQ
Title : Crystal Structure of the LDL Receptor YWTD-EGF Domain Pair
Authors : Jeon, H.; Meng, W.; Takagi, J.; Eck, M.J.; Springer, T.A.; Blacklow, S.C.
Deposited on : 2001-04-27
Resolution : 1.50 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 : 2.36.2
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) : 2.36.2

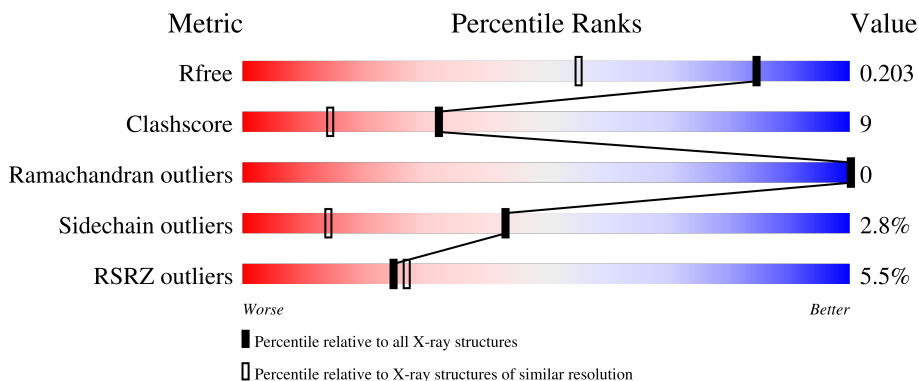
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.50 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	2936 (1.50-1.50)
Clashscore	141614	3144 (1.50-1.50)
Ramachandran outliers	138981	3066 (1.50-1.50)
Sidechain outliers	138945	3064 (1.50-1.50)
RSRZ outliers	127900	2884 (1.50-1.50)

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	316	 5% 83% 12% ...
1	B	316	 5% 80% 14% ...

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 6043 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 LOW-DENSITY LIPOPROTEIN RECEPTOR.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	308	2445	1550	424	458	13	0	0	0
1	B	305	2418	1534	418	453	13	0	0	0

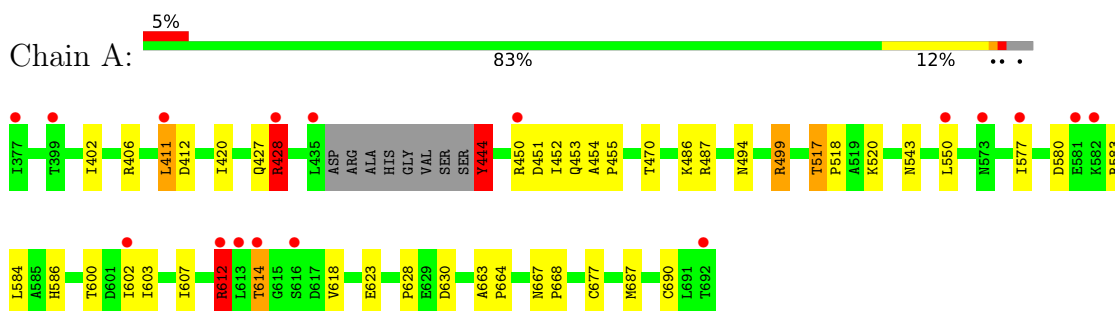
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
2	A	585	585	585	0	0
2	B	595	595	595	0	0

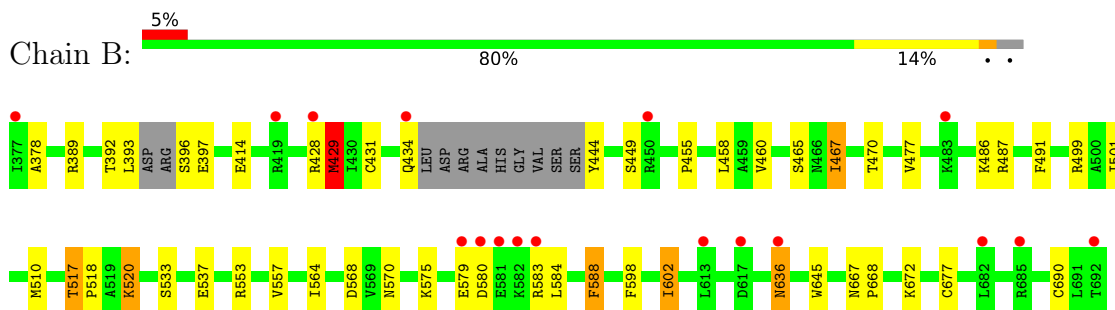
3 Residue-property plots [i](#)

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: LOW-DENSITY LIPOPROTEIN RECEPTOR



- Molecule 1: LOW-DENSITY LIPOPROTEIN RECEPTOR



4 Data and refinement statistics i

Property	Value	Source
Space group	P 32 2 1	Depositor
Cell constants a, b, c, α , β , γ	76.28Å 76.28Å 265.44Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	20.00 – 1.50 46.82 – 1.50	Depositor EDS
% Data completeness (in resolution range)	86.3 (20.00-1.50) 86.3 (46.82-1.50)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.92 (at 1.50Å)	Xtrriage
Refinement program	CNS	Depositor
R, R_{free}	0.208 , 0.250 0.207 , 0.203	Depositor DCC
R_{free} test set	6270 reflections (4.92%)	wwPDB-VP
Wilson B-factor (Å ²)	18.9	Xtrriage
Anisotropy	0.030	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 64.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.021 for -h,-k,l	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	6043	wwPDB-VP
Average B, all atoms (Å ²)	26.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.84% 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	0.64	2/2501 (0.1%)	1.06	9/3403 (0.3%)
1	B	0.40	0/2473	1.03	7/3364 (0.2%)
All	All	0.53	2/4974 (0.0%)	1.05	16/6767 (0.2%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	2
1	B	0	3
All	All	0	5

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	487	ARG	CD-NE	-17.27	1.17	1.46
1	A	444	TYR	N-CA	-17.00	1.12	1.46

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	428	ARG	NE-CZ-NH2	-9.14	115.73	120.30
1	A	518	PRO	N-CA-CB	8.72	113.76	103.30
1	A	517	THR	CA-C-O	-8.62	102.00	120.10
1	B	389	ARG	NE-CZ-NH1	8.25	124.43	120.30
1	B	517	THR	CA-C-O	-8.25	102.77	120.10
1	B	518	PRO	CA-N-CD	-7.51	100.98	111.50
1	B	429	MET	CA-CB-CG	6.97	125.14	113.30
1	A	518	PRO	CA-N-CD	-6.64	102.21	111.50
1	A	444	TYR	N-CA-CB	6.60	122.48	110.60
1	B	487	ARG	NE-CZ-NH2	6.10	123.35	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	499	ARG	NE-CZ-NH1	5.84	123.22	120.30
1	A	612	ARG	NE-CZ-NH1	5.68	123.14	120.30
1	A	518	PRO	N-CD-CG	5.54	111.52	103.20
1	B	518	PRO	N-CD-CG	5.47	111.41	103.20
1	B	518	PRO	N-CA-CB	5.19	109.52	103.30
1	A	630	ASP	CB-CG-OD2	-5.10	113.71	118.30

There are no chirality outliers.

All (5) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	517	THR	Peptide,Mainchain
1	B	517	THR	Peptide,Mainchain
1	B	636	ASN	Mainchain

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	2445	0	2417	34	0
1	B	2418	0	2388	45	0
2	A	585	0	0	11	0
2	B	595	0	0	17	0
All	All	6043	0	4805	79	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 9.

All (79) 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:677:CYS:HG	1:A:690:CYS:HG	0.97	0.86
1:B:429:MET:HE3	2:B:1284:HOH:O	1.75	0.86
1:A:411:LEU:HG	2:A:941:HOH:O	1.75	0.85
1:B:510:MET:SD	2:B:955:HOH:O	2.34	0.84

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:537:GLU:HG2	2:B:1273:HOH:O	1.76	0.83
1:B:557:VAL:HG12	1:B:564:ILE:HD12	1.63	0.81
1:A:452:ILE:HD11	1:A:455:PRO:HG3	1.60	0.80
1:B:677:CYS:HG	1:B:690:CYS:HG	0.95	0.79
1:B:486:LYS:HE3	2:B:856:HOH:O	1.81	0.79
1:B:477:VAL:HG11	1:B:510:MET:CE	2.15	0.77
1:B:501:ILE:HD11	1:B:510:MET:HE1	1.68	0.76
1:B:477:VAL:HG11	1:B:510:MET:HE1	1.69	0.75
1:B:557:VAL:HG12	1:B:564:ILE:CD1	2.20	0.71
1:B:636:ASN:HB2	2:B:998:HOH:O	1.90	0.69
1:A:454:ALA:HB3	2:A:1131:HOH:O	1.92	0.68
1:A:614:THR:HB	2:A:1260:HOH:O	1.96	0.65
1:B:491:PHE:HE2	2:B:948:HOH:O	1.84	0.61
1:B:520:LYS:HE2	1:B:533:SER:OG	2.01	0.60
1:B:397:GLU:HG2	2:B:1031:HOH:O	2.03	0.58
1:B:491:PHE:CE2	2:B:948:HOH:O	2.51	0.58
1:A:583:ARG:HD3	1:A:618:VAL:HG11	1.86	0.58
1:A:428:ARG:HD2	1:A:453:GLN:O	2.05	0.57
1:A:486:LYS:HE2	2:A:854:HOH:O	2.03	0.57
1:B:501:ILE:HD11	1:B:510:MET:CE	2.34	0.57
1:A:602:ILE:HD13	1:A:628:PRO:HD2	1.87	0.57
1:A:411:LEU:HD12	1:A:412:ASP:N	2.21	0.56
1:A:450:ARG:NH1	2:A:1259:HOH:O	2.38	0.56
1:B:465:SER:HA	2:B:1214:HOH:O	2.05	0.55
1:A:455:PRO:HA	1:A:470:THR:O	2.07	0.54
1:B:428:ARG:HA	2:B:936:HOH:O	2.07	0.54
1:A:451:ASP:HB3	2:A:878:HOH:O	2.05	0.54
1:A:663:ALA:HB1	1:A:664:PRO:HD2	1.90	0.54
1:A:402:ILE:HD11	1:A:420:ILE:HG21	1.90	0.53
1:B:378:ALA:HB3	2:B:1102:HOH:O	2.08	0.53
1:A:586:HIS:HB2	1:A:603:ILE:HD12	1.91	0.52
1:B:434:GLN:HB2	2:B:1248:HOH:O	2.10	0.52
1:B:588:PHE:CE1	1:B:602:ILE:HG12	2.45	0.52
1:A:580:ASP:OD2	1:A:583:ARG:HD2	2.09	0.52
1:B:501:ILE:CD1	1:B:510:MET:HE1	2.40	0.50
1:A:667:ASN:HB2	1:A:668:PRO:HD2	1.93	0.50
1:B:477:VAL:HG11	1:B:510:MET:HE2	1.93	0.50
1:A:687:MET:HG2	2:A:1003:HOH:O	2.12	0.50
1:A:667:ASN:HB2	1:A:668:PRO:CD	2.42	0.50
1:A:428:ARG:HD2	1:A:453:GLN:HA	1.94	0.49
1:B:667:ASN:HB2	1:B:668:PRO:CD	2.41	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:458:LEU:HD22	1:B:467:ILE:HD11	1.92	0.49
1:B:431:CYS:SG	2:B:903:HOH:O	2.32	0.49
1:B:429:MET:HE2	1:B:449:SER:HB3	1.95	0.49
1:A:550:LEU:HG	2:A:961:HOH:O	2.14	0.47
1:B:564:ILE:HD11	1:B:584:LEU:HD21	1.95	0.47
1:B:583:ARG:N	1:B:583:ARG:HD2	2.30	0.46
1:A:406:ARG:NH2	1:A:427:GLN:OE1	2.48	0.46
1:A:677:CYS:CB	1:A:690:CYS:HG	2.28	0.46
1:B:455:PRO:HA	1:B:470:THR:O	2.16	0.46
1:A:612:ARG:NH1	1:A:612:ARG:HG3	2.31	0.46
1:A:452:ILE:CD1	1:A:455:PRO:HG3	2.39	0.45
1:B:588:PHE:CD1	1:B:602:ILE:HG12	2.51	0.45
1:B:393:LEU:HD13	1:B:598:PHE:CZ	2.51	0.45
1:B:396:SER:N	2:B:851:HOH:O	2.51	0.44
1:B:414:GLU:HG3	1:B:460:VAL:HG11	2.00	0.44
1:B:645:TRP:CE2	1:B:672:LYS:HD2	2.53	0.44
1:B:444:TYR:N	2:B:1260:HOH:O	2.51	0.43
1:A:494:ASN:HA	2:A:1009:HOH:O	2.17	0.43
1:A:612:ARG:HG3	1:A:612:ARG:HH11	1.84	0.43
1:B:392:THR:HG23	1:B:397:GLU:HB3	2.01	0.43
1:B:486:LYS:HE2	2:B:917:HOH:O	2.18	0.43
1:A:577:ILE:HD11	2:A:888:HOH:O	2.19	0.42
1:B:579:GLU:O	1:B:580:ASP:HB3	2.20	0.42
1:A:580:ASP:O	1:A:584:LEU:HB2	2.20	0.42
1:B:564:ILE:HD11	1:B:584:LEU:CD2	2.50	0.42
1:B:568:ASP:HB3	1:B:570:ASN:HD21	1.85	0.42
1:A:428:ARG:HB2	1:A:428:ARG:NH1	2.34	0.41
1:A:444:TYR:N	2:A:793:HOH:O	2.53	0.41
1:B:553:ARG:HH22	1:B:575:LYS:HG3	1.85	0.41
1:A:600:THR:HG22	1:A:607:ILE:HG12	2.03	0.41
1:B:429:MET:CE	2:B:1284:HOH:O	2.50	0.41
1:B:570:ASN:ND2	1:B:570:ASN:H	2.17	0.41
1:A:586:HIS:HB2	1:A:603:ILE:CD1	2.51	0.40
1:B:520:LYS:HE3	1:B:520:LYS:HB3	1.80	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	304/316 (96%)	288 (95%)	16 (5%)	0	100	100
1	B	299/316 (95%)	281 (94%)	18 (6%)	0	100	100
All	All	603/632 (95%)	569 (94%)	34 (6%)	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	274/280 (98%)	265 (97%)	9 (3%)	38	10
1	B	271/280 (97%)	265 (98%)	6 (2%)	52	22
All	All	545/560 (97%)	530 (97%)	15 (3%)	43	14

All (15) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	411	LEU
1	A	428	ARG
1	A	444	TYR
1	A	499	ARG
1	A	520	LYS
1	A	543	ASN
1	A	612	ARG
1	A	614	THR

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Mol	Chain	Res	Type
1	A	623	GLU
1	B	429	MET
1	B	467	ILE
1	B	499	ARG
1	B	520	LYS
1	B	588	PHE
1	B	602	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	453	GLN
1	A	543	ASN
1	A	573	ASN
1	A	586	HIS
1	B	418	ASN

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

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	308/316 (97%)	0.52	17 (5%) 25 27	13, 21, 33, 40	0
1	B	305/316 (96%)	0.46	17 (5%) 24 26	13, 21, 33, 44	0
All	All	613/632 (96%)	0.49	34 (5%) 25 27	13, 21, 33, 44	0

All (34) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	692	THR	6.7
1	A	613	LEU	6.5
1	A	550	LEU	6.0
1	A	614	THR	5.8
1	B	434	GLN	4.5
1	B	583	ARG	4.0
1	B	613	LEU	3.9
1	A	692	THR	3.9
1	A	450	ARG	3.7
1	A	435	LEU	3.6
1	B	682	LEU	3.6
1	B	582	LYS	3.5
1	B	581	GLU	3.1
1	B	450	ARG	2.9
1	A	411	LEU	2.8
1	B	483	LYS	2.8
1	A	616	SER	2.8
1	A	428	ARG	2.8
1	B	636	ASN	2.8
1	A	581	GLU	2.7
1	B	580	ASP	2.7
1	B	685	ARG	2.6
1	B	428	ARG	2.6
1	A	582	LYS	2.6

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Mol	Chain	Res	Type	RSRZ
1	B	579	GLU	2.4
1	B	617	ASP	2.3
1	A	377	ILE	2.3
1	A	602	ILE	2.3
1	A	612	ARG	2.2
1	A	577	ILE	2.1
1	A	573	ASN	2.1
1	B	419	ARG	2.1
1	A	399	THR	2.1
1	B	377	ILE	2.1

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.