



Full wwPDB X-ray Structure Validation Report ⓘ

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PDB ID : 6XZ4 / pdb_00006xz4
Title : Crystal structure of TLNRD1
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Deposited on : 2020-02-01
Resolution : 2.30 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

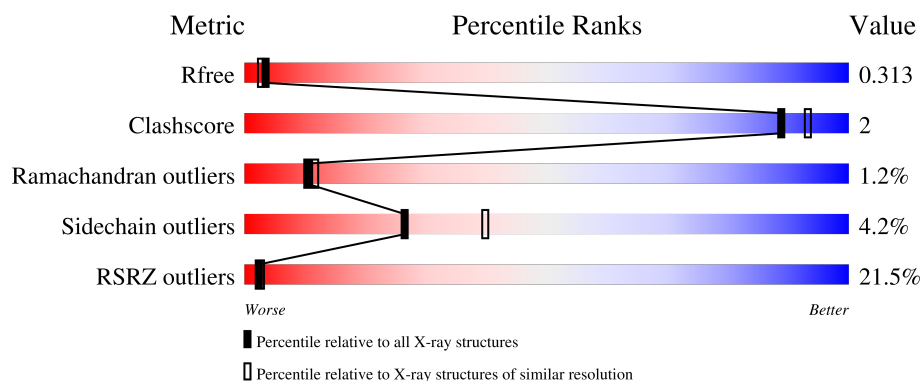
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 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	6319 (2.30-2.30)
Clashscore	190562	6919 (2.30-2.30)
Ramachandran outliers	187476	6854 (2.30-2.30)
Sidechain outliers	187428	6854 (2.30-2.30)
RSRZ outliers	180081	6325 (2.30-2.30)

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	368	19% 76% 6% 17%
1	B	368	17% 77% 5% 17%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 9117 atoms, of which 4564 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 Talin rod domain-containing protein 1.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	304	Total	C	H	N	O	S	0	1	0
			4520	1381	2281	410	429	19			
1	B	304	Total	C	H	N	O	S	0	1	0
			4527	1384	2283	412	429	19			

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-5	GLY	-	expression tag	UNP Q9H1K6
A	-4	ILE	-	expression tag	UNP Q9H1K6
A	-3	ASP	-	expression tag	UNP Q9H1K6
A	-2	PRO	-	expression tag	UNP Q9H1K6
A	-1	PHE	-	expression tag	UNP Q9H1K6
A	0	THR	-	expression tag	UNP Q9H1K6
B	-5	GLY	-	expression tag	UNP Q9H1K6
B	-4	ILE	-	expression tag	UNP Q9H1K6
B	-3	ASP	-	expression tag	UNP Q9H1K6
B	-2	PRO	-	expression tag	UNP Q9H1K6
B	-1	PHE	-	expression tag	UNP Q9H1K6
B	0	THR	-	expression tag	UNP Q9H1K6

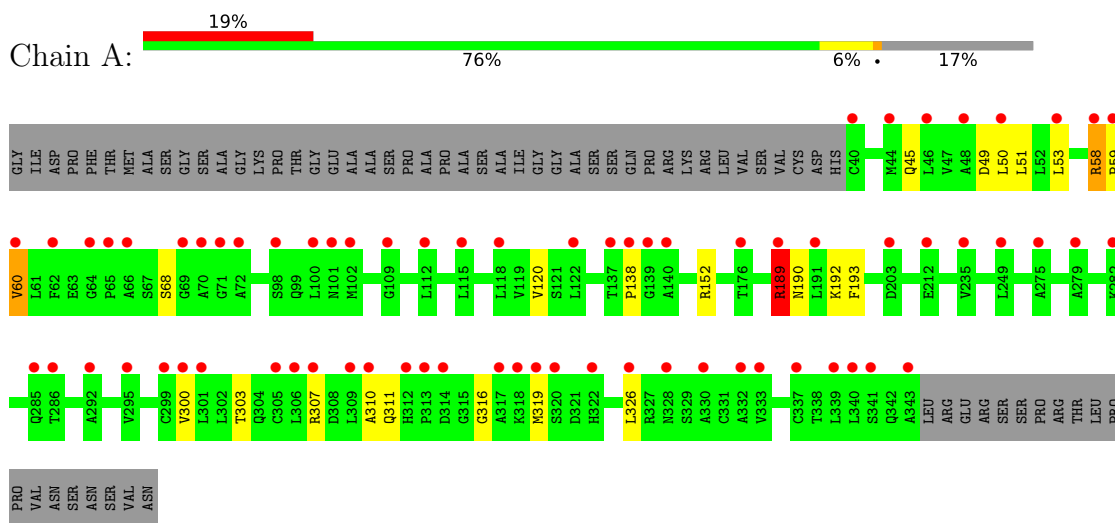
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	39	Total	O	0	0
			39	39		
2	B	31	Total	O	0	0
			31	31		

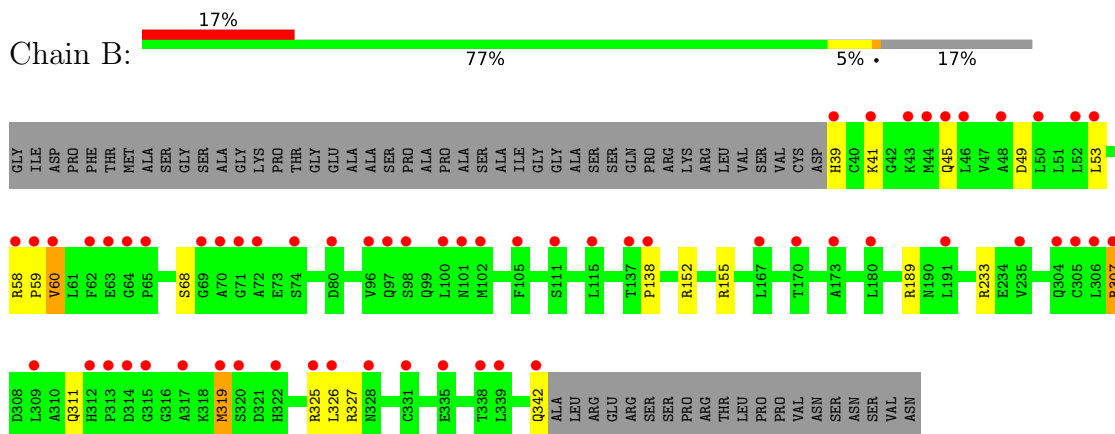
3 Residue-property plots [i](#)

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: Talin rod domain-containing protein 1



• Molecule 1: Talin rod domain-containing protein 1



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	69.17Å 58.04Å 84.32Å 90.00° 106.10° 90.00°	Depositor
Resolution (Å)	60.22 – 2.30 60.22 – 2.30	Depositor EDS
% Data completeness (in resolution range)	97.1 (60.22-2.30) 97.8 (60.22-2.30)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.96 (at 2.29Å)	Xtriage
Refinement program	PHENIX 1.9_1692	Depositor
R, R_{free}	0.262 , 0.315 0.276 , 0.313	Depositor DCC
R_{free} test set	1403 reflections (4.86%)	wwPDB-VP
Wilson B-factor (Å ²)	42.3	Xtriage
Anisotropy	0.988	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.42 , 50.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.54$, $\langle L^2 \rangle = 0.38$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	9117	wwPDB-VP
Average B, all atoms (Å ²)	74.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 47.00 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 1.0567e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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	0.42	0/2265	0.79	5/3060 (0.2%)
1	B	0.34	0/2271	0.73	3/3068 (0.1%)
All	All	0.38	0/4536	0.76	8/6128 (0.1%)

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	3

There are no bond length outliers.

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	60	VAL	N-CA-C	-8.24	104.45	113.43
1	A	60	VAL	N-CA-C	-7.28	105.50	113.43
1	A	189[A]	ARG	CA-C-N	6.12	128.48	120.28
1	A	189[A]	ARG	C-N-CA	6.12	128.48	120.28
1	A	189[B]	ARG	CA-C-N	6.12	128.48	120.28
1	A	189[B]	ARG	C-N-CA	6.12	128.48	120.28
1	B	319	MET	N-CA-C	-5.67	105.86	112.89
1	B	41	LYS	N-CA-C	-5.29	106.33	112.89

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	189[A]	ARG	Mainchain,Sidechain
1	A	189[B]	ARG	Mainchain

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	2239	2281	2280	8	0
1	B	2244	2283	2282	9	0
2	A	39	0	0	0	0
2	B	31	0	0	2	0
All	All	4553	4564	4562	17	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 (17) 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:300:VAL:O	1:A:303:THR:OG1	2.17	0.55
1:A:45:GLN:NE2	1:A:310:ALA:O	2.47	0.48
1:B:233:ARG:NH2	2:B:401:HOH:O	2.42	0.48
1:B:307:ARG:HA	1:B:307:ARG:CZ	2.44	0.48
1:B:45:GLN:HG3	1:B:307:ARG:CZ	2.44	0.47
1:B:58:ARG:C	1:B:60:VAL:H	2.22	0.46
1:A:152:ARG:HG2	1:A:193:PHE:CZ	2.50	0.46
1:A:51:LEU:HD22	1:A:303:THR:HG21	1.96	0.46
1:A:58:ARG:C	1:A:60:VAL:H	2.23	0.46
1:B:189[A]:ARG:NH1	2:B:403:HOH:O	2.47	0.46
1:B:189[B]:ARG:HG3	1:B:189[B]:ARG:HH11	1.82	0.45
1:B:325:ARG:N	1:B:325:ARG:HD3	2.32	0.45
1:A:58:ARG:HD2	1:A:120:VAL:HG13	2.01	0.43
1:B:189[B]:ARG:HG3	1:B:189[B]:ARG:NH1	2.36	0.41
1:A:190:ASN:HD22	1:A:190:ASN:HA	1.76	0.40
1:A:58:ARG:CD	1:A:120:VAL:HG13	2.52	0.40
1:B:342:GLN:OE1	1:B:342:GLN: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	303/368 (82%)	289 (95%)	10 (3%)	4 (1%)	9	10
1	B	303/368 (82%)	288 (95%)	12 (4%)	3 (1%)	12	15
All	All	606/736 (82%)	577 (95%)	22 (4%)	7 (1%)	10	12

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	49	ASP
1	A	138	PRO
1	A	316	GLY
1	B	49	ASP
1	B	138	PRO
1	A	59	PRO
1	B	59	PRO

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	239/288 (83%)	228 (95%)	11 (5%)	24	36
1	B	240/288 (83%)	230 (96%)	10 (4%)	26	40
All	All	479/576 (83%)	458 (96%)	21 (4%)	26	38

All (21) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	50	LEU
1	A	53	LEU
1	A	58	ARG
1	A	68	SER
1	A	189[A]	ARG
1	A	189[B]	ARG
1	A	192	LYS
1	A	307	ARG
1	A	311	GLN
1	A	319	MET
1	A	326	LEU
1	B	39	HIS
1	B	53	LEU
1	B	68	SER
1	B	152	ARG
1	B	155	ARG
1	B	307	ARG
1	B	311	GLN
1	B	319	MET
1	B	326	LEU
1	B	327	ARG

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	158	HIS
1	B	101	ASN
1	B	128	HIS
1	B	158	HIS
1	B	178	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 [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

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	304/368 (82%)	1.37	70 (23%)	2 2	35, 70, 125, 169	6 (1%)
1	B	304/368 (82%)	1.26	61 (20%)	3 3	36, 64, 115, 172	4 (1%)
All	All	608/736 (82%)	1.32	131 (21%)	2 3	35, 67, 121, 172	10 (1%)

All (131) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	70	ALA	5.9
1	A	58	ARG	5.5
1	B	58	ARG	5.5
1	B	326	LEU	5.2
1	A	339	LEU	4.8
1	A	322	HIS	4.8
1	B	64	GLY	4.8
1	A	326	LEU	4.7
1	B	60	VAL	4.7
1	A	60	VAL	4.6
1	B	72	ALA	4.6
1	B	307	ARG	4.5
1	A	191	LEU	4.4
1	A	65	PRO	4.2
1	A	312	HIS	4.1
1	B	339	LEU	4.1
1	A	64	GLY	4.0
1	A	102	MET	4.0
1	A	72	ALA	3.9
1	B	65	PRO	3.9
1	A	343	ALA	3.8
1	A	292	ALA	3.8
1	B	335	GLU	3.8
1	B	98	SER	3.8

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Mol	Chain	Res	Type	RSRZ
1	A	62	PHE	3.8
1	A	50	LEU	3.8
1	B	46	LEU	3.8
1	B	71	GLY	3.6
1	B	100	LEU	3.6
1	A	319	MET	3.5
1	B	312	HIS	3.5
1	B	313	PRO	3.5
1	A	139	GLY	3.4
1	B	102	MET	3.4
1	B	315	GLY	3.4
1	B	306	LEU	3.3
1	B	59	PRO	3.3
1	A	337	CYS	3.3
1	B	309	LEU	3.3
1	A	59	PRO	3.3
1	A	44	MET	3.2
1	B	322	HIS	3.2
1	A	138	PRO	3.2
1	B	328	ASN	3.1
1	B	96	VAL	3.1
1	A	320	SER	3.0
1	B	41	LYS	3.0
1	A	279	ALA	3.0
1	B	62	PHE	3.0
1	A	109	GLY	3.0
1	A	53	LEU	2.9
1	B	44	MET	2.9
1	B	319	MET	2.9
1	B	43	LYS	2.9
1	B	317	ALA	2.9
1	A	332	ALA	2.9
1	B	101	ASN	2.9
1	A	71	GLY	2.8
1	B	74	SER	2.8
1	A	328	ASN	2.8
1	A	140	ALA	2.8
1	A	295	VAL	2.8
1	B	39	HIS	2.8
1	B	235	VAL	2.8
1	B	52	LEU	2.7
1	A	317	ALA	2.7

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Mol	Chain	Res	Type	RSRZ
1	A	46	LEU	2.7
1	A	235	VAL	2.7
1	A	309	LEU	2.7
1	A	203	ASP	2.7
1	B	305	CYS	2.7
1	A	70	ALA	2.6
1	A	310	ALA	2.6
1	B	105	PHE	2.6
1	B	48	ALA	2.6
1	B	45	GLN	2.6
1	A	305	CYS	2.6
1	B	342	GLN	2.6
1	A	307	ARG	2.5
1	A	122	LEU	2.5
1	A	306	LEU	2.5
1	B	191	LEU	2.5
1	B	173	ALA	2.5
1	B	63	GLU	2.5
1	B	325	ARG	2.5
1	B	180	LEU	2.5
1	A	314	ASP	2.5
1	B	338	THR	2.5
1	A	100	LEU	2.4
1	B	115	LEU	2.4
1	A	69	GLY	2.4
1	A	313	PRO	2.4
1	B	167	LEU	2.4
1	B	170	THR	2.4
1	B	320	SER	2.4
1	A	318	LYS	2.4
1	A	330	ALA	2.4
1	A	137	THR	2.4
1	A	115	LEU	2.4
1	B	53	LEU	2.4
1	A	300	VAL	2.3
1	A	176	THR	2.3
1	A	98	SER	2.3
1	A	112	LEU	2.2
1	A	249	LEU	2.2
1	A	299	CYS	2.2
1	B	80	ASP	2.2
1	A	212	GLU	2.2

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Mol	Chain	Res	Type	RSRZ
1	B	69	GLY	2.2
1	A	48	ALA	2.2
1	A	285	GLN	2.2
1	A	275	ALA	2.2
1	A	340	LEU	2.2
1	B	331	CYS	2.2
1	A	286	THR	2.2
1	A	301	LEU	2.1
1	B	50	LEU	2.1
1	B	304	GLN	2.1
1	A	333	VAL	2.1
1	B	97	GLN	2.1
1	A	341	SER	2.1
1	A	101	ASN	2.1
1	B	314	ASP	2.1
1	B	111	SER	2.1
1	B	137	THR	2.1
1	A	118	LEU	2.1
1	A	66	ALA	2.0
1	A	282	LYS	2.0
1	A	40	CYS	2.0
1	A	189[A]	ARG	2.0
1	B	138	PRO	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 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.