



# wwPDB X-ray Structure Validation Summary Report ⓘ

Jun 18, 2024 – 02:44 PM EDT

PDB ID : 4JO3  
Title : Crystal structure of rabbit mAb R20 Fab in complex with V3 C-terminus of HIV-1 Consensus B gp120  
Authors : Pan, R.M.; Kong, X.P.  
Deposited on : 2013-03-16  
Resolution : 2.60 Å(reported)

This is a wwPDB X-ray Structure Validation Summary Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto: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>.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.20.1
EDS	:	2.37.1
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)	:	2.37.1

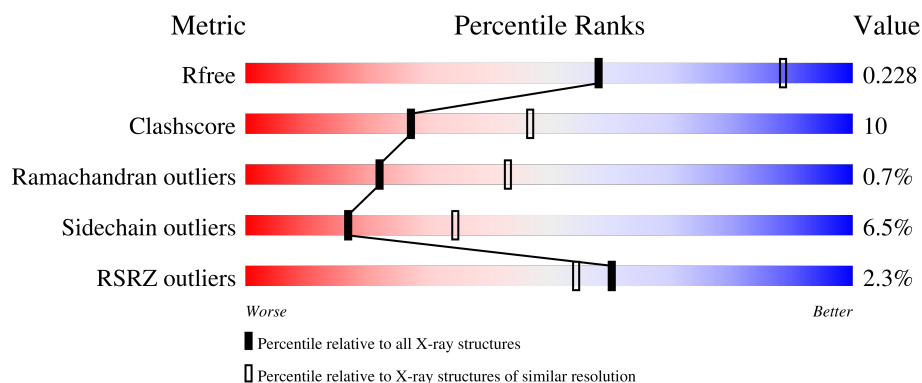
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*





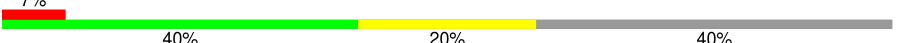
The reported resolution of this entry is 2.60 Å.

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	3163 (2.60-2.60)
Clashscore	141614	3518 (2.60-2.60)
Ramachandran outliers	138981	3455 (2.60-2.60)
Sidechain outliers	138945	3455 (2.60-2.60)
RSRZ outliers	127900	3104 (2.60-2.60)

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  $\geq 3$ , 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	L	214	 79% 19% .
1	M	214	 79% 20% .
2	H	227	 4% 79% 18% .
2	I	227	 4% 74% 22% .
3	P	15	 7% 40% 20% 40%

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Mol	Chain	Length	Quality of chain
3	Q	15	 A horizontal bar chart showing the quality of chain Q. The bar is divided into three segments: a green segment representing 47%, a yellow segment representing 13%, and a grey segment representing 40%. The percentages are labeled below the corresponding segments.

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 7039 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 monoclonal anti-HIV-1 gp120 V3 antibody R20 light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	L	214	Total	C	N	O	S	0	0	0
			1583	984	256	335	8			
1	M	214	Total	C	N	O	S	0	0	0
			1583	984	256	335	8			

- Molecule 2 is a protein called monoclonal anti-HIV-1 gp120 V3 antibody R20 heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	H	227	Total	C	N	O	S	0	0	0
			1677	1063	273	331	10			
2	I	227	Total	C	N	O	S	0	0	0
			1677	1063	273	331	10			

- Molecule 3 is a protein called gp120.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	P	9	Total	C	N	O	0	0	0
			70	43	13	14			
3	Q	9	Total	C	N	O	0	0	0
			70	43	13	14			

- Molecule 4 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	M	1	Total	O	S	0	0
			5	4	1		
4	M	1	Total	O	S	0	0
			5	4	1		

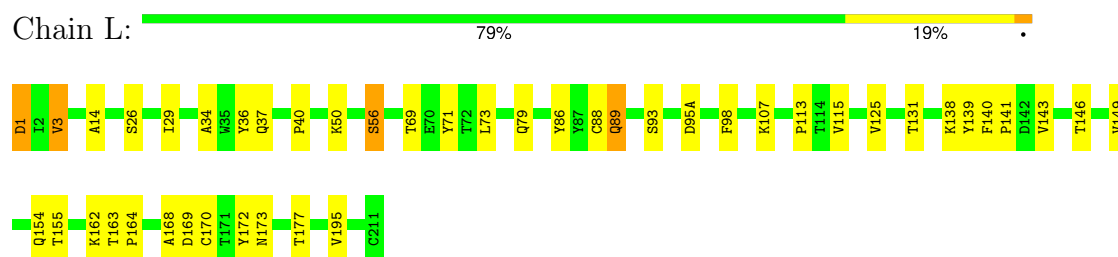
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	L	92	Total	O	0	0
			92	92		
5	H	78	Total	O	0	0
			78	78		
5	M	86	Total	O	0	0
			86	86		
5	I	111	Total	O	0	0
			111	111		
5	Q	2	Total	O	0	0
			2	2		

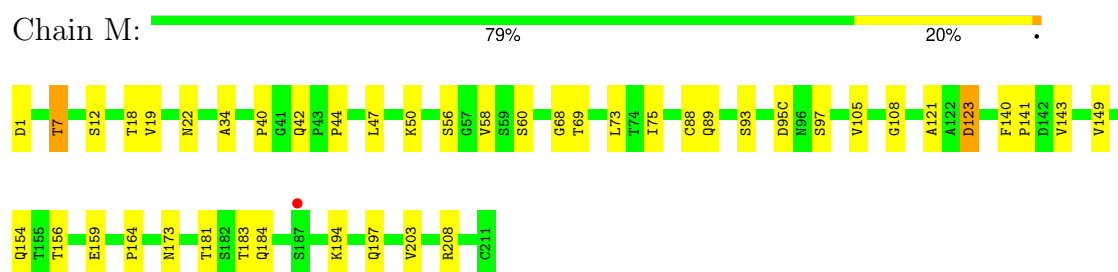
### 3 Residue-property plots

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.

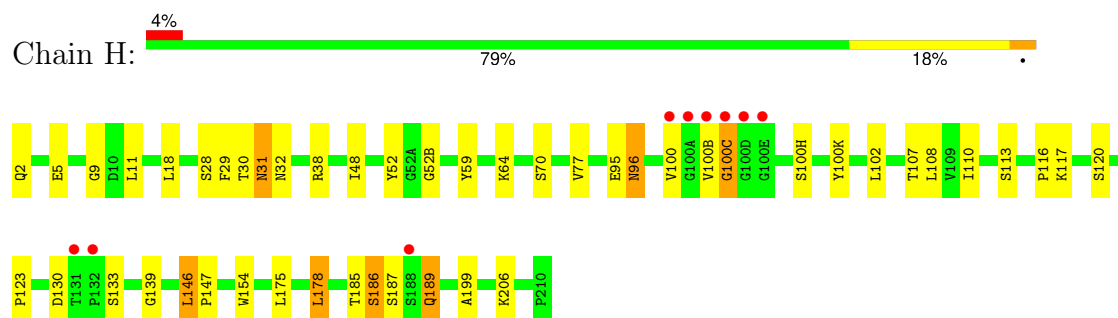
- Molecule 1: monoclonal anti-HIV-1 gp120 V3 antibody R20 light chain



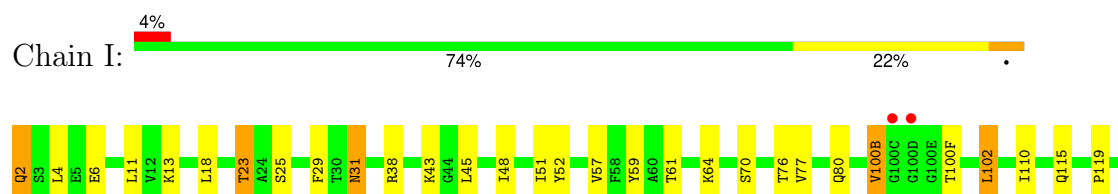
- Molecule 1: monoclonal anti-HIV-1 gp120 V3 antibody R20 light chain

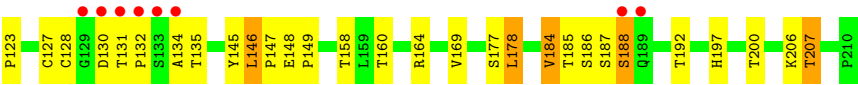


- Molecule 2: monoclonal anti-HIV-1 gp120 V3 antibody R20 heavy chain

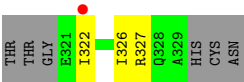


- Molecule 2: monoclonal anti-HIV-1 gp120 V3 antibody R20 heavy chain

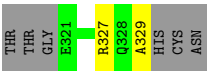




● Molecule 3: gp120



● Molecule 3: gp120



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	70.22Å 118.98Å 134.95Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	38.05 – 2.60 38.05 – 2.58	Depositor EDS
% Data completeness (in resolution range)	97.6 (38.05-2.60) 96.4 (38.05-2.58)	Depositor EDS
$R_{merge}$	0.15	Depositor
$R_{sym}$	0.16	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.83 (at 2.58Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.7_650)	Depositor
R, $R_{free}$	0.184 , 0.234 0.179 , 0.228	Depositor DCC
$R_{free}$ test set	1770 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	36.9	Xtriage
Anisotropy	0.449	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 34.9	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	7039	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	35.0	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 25.32 % 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 3.2430e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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: SO4

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	L	0.43	0/1613	0.59	0/2209
1	M	0.44	0/1613	0.60	0/2209
2	H	0.44	0/1720	0.59	0/2357
2	I	0.47	0/1720	0.62	0/2357
3	P	0.29	0/69	0.55	0/91
3	Q	0.46	0/69	0.60	0/91
All	All	0.44	0/6804	0.60	0/9314

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	L	1583	0	1523	28	0
1	M	1583	0	1523	26	0
2	H	1677	0	1628	40	0
2	I	1677	0	1628	53	0
3	P	70	0	71	4	0
3	Q	70	0	71	2	0
4	M	10	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	H	78	0	0	3	1
5	I	111	0	0	5	1
5	L	92	0	0	5	0
5	M	86	0	0	1	0
5	Q	2	0	0	0	0
All	All	7039	0	6444	132	1

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 10.

The worst 5 of 132 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)
2:H:186:SER:HB2	2:H:189:GLN:HG3	1.41	0.99
2:I:2:GLN:N	2:I:2:GLN:NE2	2.19	0.89
2:I:51:ILE:HG13	2:I:57:VAL:HG12	1.55	0.88
2:I:146:LEU:HD22	2:I:147:PRO:HA	1.57	0.86
2:H:146:LEU:HD22	2:H:147:PRO:HA	1.61	0.82

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:H:349:HOH:O	5:I:374:HOH:O[3_655]	2.18	0.02

## 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	L	212/214 (99%)	205 (97%)	6 (3%)	1 (0%)	29	52
1	M	212/214 (99%)	199 (94%)	12 (6%)	1 (0%)	29	52

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	H	225/227 (99%)	215 (96%)	9 (4%)	1 (0%)	34	57
2	I	225/227 (99%)	212 (94%)	10 (4%)	3 (1%)	12	24
3	P	7/15 (47%)	4 (57%)	3 (43%)	0	100	100
3	Q	7/15 (47%)	6 (86%)	1 (14%)	0	100	100
All	All	888/912 (97%)	841 (95%)	41 (5%)	6 (1%)	22	43

5 of 6 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	I	134	ALA
1	L	138	LYS
2	I	132	PRO
2	I	188	SER
2	H	100(C)	GLY

### 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	L	181/181 (100%)	173 (96%)	8 (4%)	28	53
1	M	181/181 (100%)	170 (94%)	11 (6%)	18	38
2	H	187/187 (100%)	172 (92%)	15 (8%)	12	24
2	I	187/187 (100%)	172 (92%)	15 (8%)	12	24
3	P	7/12 (58%)	7 (100%)	0	100	100
3	Q	7/12 (58%)	7 (100%)	0	100	100
All	All	750/760 (99%)	701 (94%)	49 (6%)	17	34

5 of 49 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	M	60	SER
2	I	18	LEU

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Mol	Chain	Res	Type
1	M	69	THR
1	M	156	THR
2	I	31	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 10 such sidechains are listed below:

Mol	Chain	Res	Type
2	I	32	ASN
2	I	115	GLN
2	I	197	HIS
2	H	31	ASN
2	H	189	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	$\# Z  > 2$
4	SO4	M	302	-	4,4,4	0.34	0	6,6,6	0.17	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z  > 2$	Counts	RMSZ	$\# Z  > 2$
4	SO4	M	301	-	4,4,4	0.25	0	6,6,6	0.23	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 [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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	L	214/214 (100%)	-0.48	0 <span>100</span> <span>100</span>	22, 32, 44, 64	0
1	M	214/214 (100%)	-0.40	1 (0%) <span>91</span> <span>89</span>	23, 35, 50, 65	0
2	H	227/227 (100%)	-0.29	9 (3%) <span>38</span> <span>31</span>	21, 32, 71, 95	0
2	I	227/227 (100%)	-0.37	10 (4%) <span>34</span> <span>27</span>	22, 30, 75, 105	0
3	P	9/15 (60%)	0.30	1 (11%) <span>5</span> <span>3</span>	44, 48, 59, 62	0
3	Q	9/15 (60%)	-0.46	0 <span>100</span> <span>100</span>	34, 37, 44, 51	0
All	All	900/912 (98%)	-0.38	21 (2%) <span>60</span> <span>54</span>	21, 32, 59, 105	0

The worst 5 of 21 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	H	100(C)	GLY	5.1
2	I	132	PRO	5.0
2	H	100(B)	VAL	3.8
2	H	100(D)	GLY	3.8
2	I	129	GLY	3.7

### 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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
4	SO4	M	302	5/5	0.86	0.38	60,63,91,98	0
4	SO4	M	301	5/5	0.96	0.10	59,62,72,82	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.