



# Full wwPDB X-ray Structure Validation Report ⓘ

Sep 27, 2021 – 03:01 pm BST

PDB ID : 6ZTK  
Title : Crystal structure of Mialostatin, a gut cystatin from the hard tick *Ixodes ricinus*  
Authors : Busa, M.; Rezacova, P.; Mares, M.  
Deposited on : 2020-07-20  
Resolution : 1.55 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](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 following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtrriage (Phenix) : **NOT EXECUTED**  
EDS : **NOT EXECUTED**  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.23.2

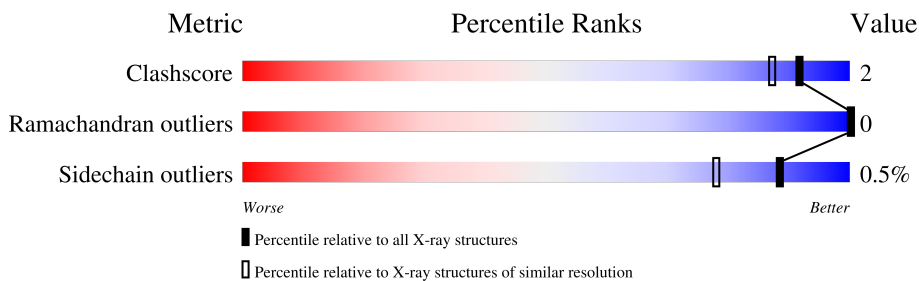
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.55 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))
Clashscore	141614	1529 (1.56-1.56)
Ramachandran outliers	138981	1498 (1.56-1.56)
Sidechain outliers	138945	1495 (1.56-1.56)

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  $\leq 5\%$ .

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	141	 72% 23%
1	B	141	 74% 22%

## 2 Entry composition i

There are 4 unique types of molecules in this entry. The entry contains 2243 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.

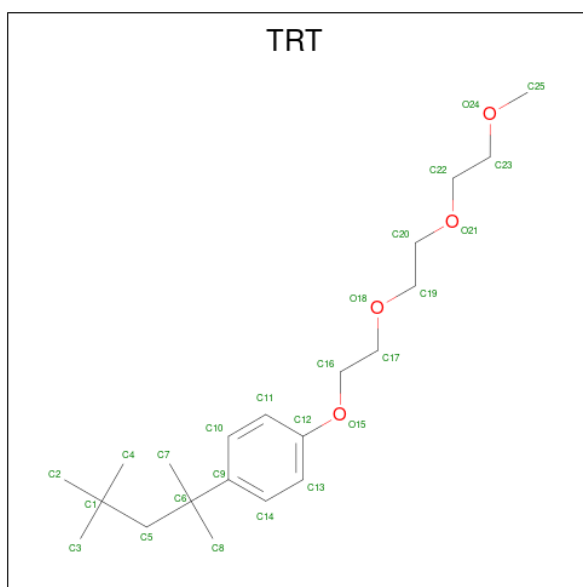
- Molecule 1 is a protein called Mialostatin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	B	110	906	574	149	179	4	0	6	0
1	A	108	903	577	150	172	4	0	7	0

There are 22 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-18	MET	-	initiating methionine	UNP V5H924
B	-17	ASP	-	expression tag	UNP V5H924
B	-16	ILE	-	expression tag	UNP V5H924
B	-15	CYS	-	expression tag	UNP V5H924
B	-14	TRP	-	expression tag	UNP V5H924
B	-13	ASN	-	expression tag	UNP V5H924
B	-12	SER	-	expression tag	UNP V5H924
B	-11	PRO	-	expression tag	UNP V5H924
B	-10	LEU	-	expression tag	UNP V5H924
B	76	SER	THR	conflict	UNP V5H924
B	121	ASN	ASP	conflict	UNP V5H924
A	-18	MET	-	initiating methionine	UNP V5H924
A	-17	ASP	-	expression tag	UNP V5H924
A	-16	ILE	-	expression tag	UNP V5H924
A	-15	CYS	-	expression tag	UNP V5H924
A	-14	TRP	-	expression tag	UNP V5H924
A	-13	ASN	-	expression tag	UNP V5H924
A	-12	SER	-	expression tag	UNP V5H924
A	-11	PRO	-	expression tag	UNP V5H924
A	-10	LEU	-	expression tag	UNP V5H924
A	76	SER	THR	conflict	UNP V5H924
A	121	ASN	ASP	conflict	UNP V5H924

- Molecule 2 is FRAGMENT OF TRITON X-100 (three-letter code: TRT) (formula: C<sub>21</sub>H<sub>36</sub>O<sub>4</sub>).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf	
2	B	1	Total	C	O	0	1
			24	20	4		
2	A	1	Total	C	O	0	1
			24	20	4		

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf	
3	B	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		

*Continued on next page...*

*Continued from previous page...*

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

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	B	185	Total	O	0	4
			186	186		
4	A	184	Total	O	0	5
			185	185		



## 4 Data and refinement statistics

Xtrriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 62 2 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	81.11Å 81.11Å 162.33Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	42.90 – 1.55	Depositor
% Data completeness (in resolution range)	99.9 (42.90-1.55)	Depositor
$R_{merge}$	0.08	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	REFMAC 5.8.0258	Depositor
R, $R_{free}$	0.171 , 0.201	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	2243	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	24.0	wwPDB-VP

## 5 Model quality

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: TRT, 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	A	0.86	0/940	0.97	0/1280
1	B	0.85	0/937	1.00	0/1278
All	All	0.86	0/1877	0.99	0/2558

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

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	903	0	906	3	0
1	B	906	0	882	3	0
2	A	24	0	33	0	0
2	B	24	0	33	0	0
3	A	10	0	0	0	0
3	B	5	0	0	0	0
4	A	185	0	0	0	0
4	B	186	0	0	1	0
All	All	2243	0	1854	6	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 (6) 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:21:ASN:HB3	1:B:24:PHE:CD2	2.48	0.48
1:B:13:GLY:O	1:B:54:GLN:HG2	2.17	0.45
1:A:21:ASN:HB3	1:A:24:PHE:CD2	2.54	0.42
1:B:110[A]:ARG:NH1	4:B:607[A]:HOH:O	2.51	0.42
1:A:48:LEU:HD21	1:A:51:VAL:CG2	2.50	0.40
1:A:14:TRP:HB3	1:A:52:GLN:HB3	2.03	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	113/141 (80%)	109 (96%)	4 (4%)	0	100	100
1	B	114/141 (81%)	112 (98%)	2 (2%)	0	100	100
All	All	227/282 (80%)	221 (97%)	6 (3%)	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	104/125 (83%)	104 (100%)	0	100	100

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	B	103/125 (82%)	101 (98%)	2 (2%)	57	28
All	All	207/250 (83%)	205 (99%)	2 (1%)	88	57

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	83[A]	GLU
1	B	83[B]	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	54	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](#)

5 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	TRT	B	501[B]	-	24,24,25	0.31	0	32,32,33	0.93	1 (3%)
3	SO4	A	203	-	4,4,4	0.20	0	6,6,6	0.12	0
3	SO4	A	202	-	4,4,4	0.25	0	6,6,6	0.16	0
3	SO4	B	502	-	4,4,4	0.28	0	6,6,6	0.15	0
2	TRT	A	201[A]	-	24,24,25	0.31	0	32,32,33	0.87	1 (3%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	TRT	B	501[B]	-	-	9/22/22/23	0/1/1/1
2	TRT	A	201[A]	-	-	10/22/22/23	0/1/1/1

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	501[B]	TRT	C8-C6-C9	-3.88	100.47	110.20
2	A	201[A]	TRT	C8-C6-C9	-3.54	101.32	110.20

There are no chirality outliers.

All (19) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	501[B]	TRT	O21-C22-C23-O24
2	A	201[A]	TRT	C11-C12-O15-C16
2	A	201[A]	TRT	C13-C12-O15-C16
2	B	501[B]	TRT	C13-C12-O15-C16
2	B	501[B]	TRT	C11-C12-O15-C16
2	B	501[B]	TRT	O15-C16-C17-O18
2	A	201[A]	TRT	C5-C6-C9-C14
2	A	201[A]	TRT	O21-C22-C23-O24
2	B	501[B]	TRT	C5-C6-C9-C14
2	B	501[B]	TRT	C5-C6-C9-C10
2	A	201[A]	TRT	C5-C6-C9-C10
2	B	501[B]	TRT	C19-C20-O21-C22
2	A	201[A]	TRT	C19-C20-O21-C22
2	A	201[A]	TRT	O15-C16-C17-O18

*Continued on next page...*

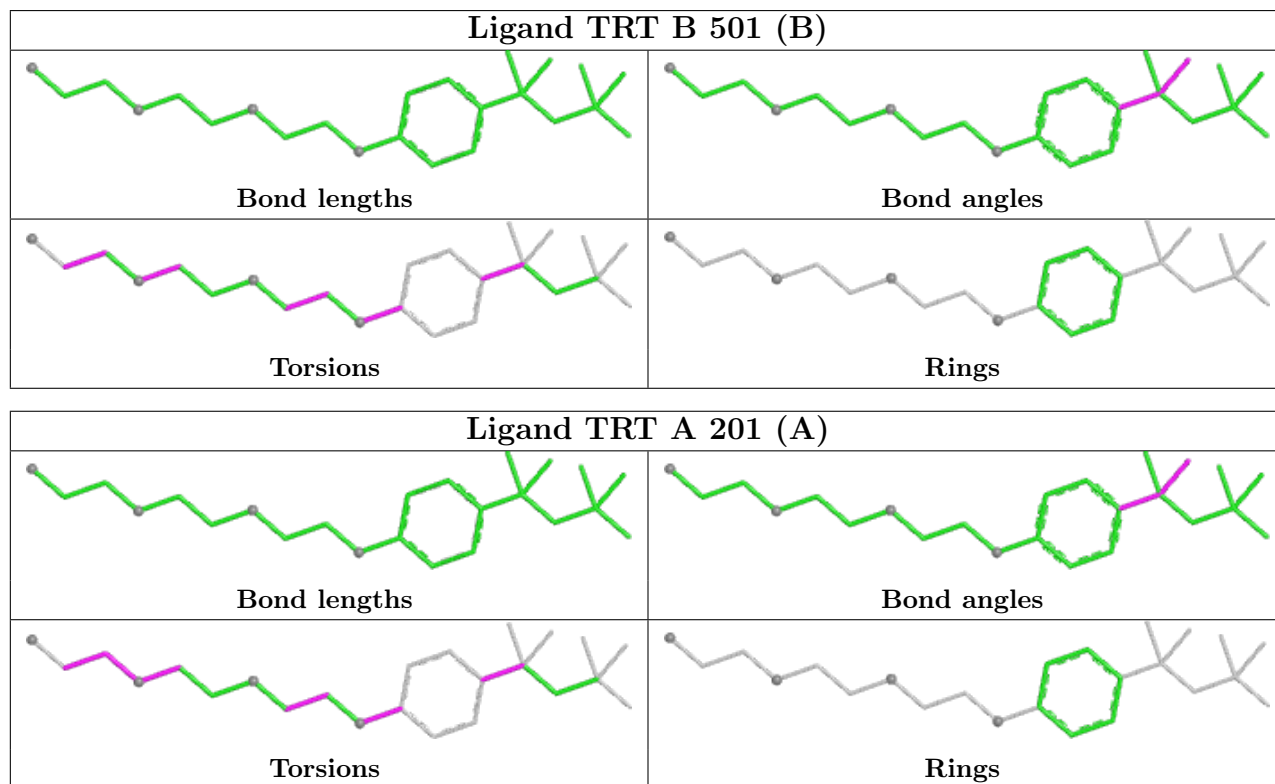
Continued from previous page...

Mol	Chain	Res	Type	Atoms
2	A	201[A]	TRT	C23-C22-O21-C20
2	A	201[A]	TRT	C8-C6-C9-C14
2	A	201[A]	TRT	C8-C6-C9-C10
2	B	501[B]	TRT	C8-C6-C9-C10
2	B	501[B]	TRT	C8-C6-C9-C14

There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



## 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

EDS was not executed - this section is therefore empty.

### 6.2 Non-standard residues in protein, DNA, RNA chains

EDS was not executed - this section is therefore empty.

### 6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

### 6.4 Ligands

EDS was not executed - this section is therefore empty.

### 6.5 Other polymers

EDS was not executed - this section is therefore empty.