



# Full wwPDB X-ray Structure Validation Report ⓘ

Apr 20, 2019 – 11:00 AM EDT

PDB ID : 6D3X  
Title : Highly Potent and Selective Plasmin Inhibitors Based on the Sunflower Trypsin Inhibitor-1 Scaffold Attenuate Fibrinolysis in Plasma  
Authors : Law, R.H.P.; Wu, G.  
Deposited on : 2018-04-17  
Resolution : 1.80 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.

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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  
Xtrriage (Phenix) : 1.13  
EDS : rb-20031633  
Percentile statistics : 20171227.v01 (using entries in the PDB archive December 27th 2017)  
Refmac : 5.8.0158  
CCP4 : 7.0 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : rb-20031633

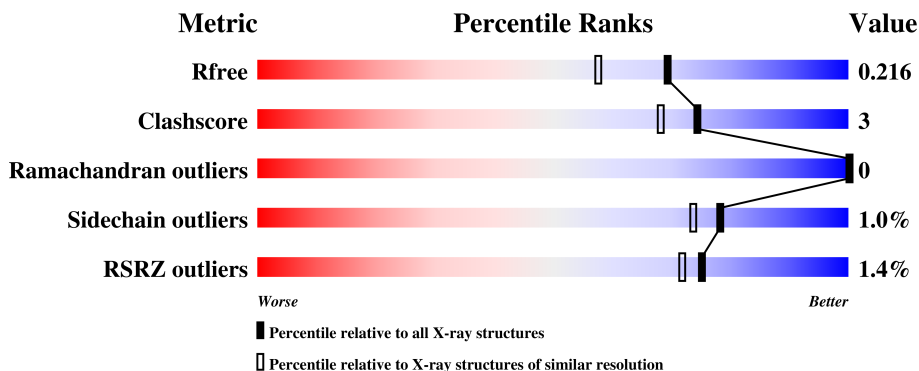
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.80 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))
$R_{free}$	111664	5253 (1.80-1.80)
Clashscore	122126	6077 (1.80-1.80)
Ramachandran outliers	120053	6011 (1.80-1.80)
Sidechain outliers	120020	6010 (1.80-1.80)
RSRZ outliers	108989	5157 (1.80-1.80)

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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. 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	246	 91% 9%
1	B	246	 89% 11%
2	C	14	 93% 7%
2	D	14	 100%

## 2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 4281 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 Plasminogen.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	244	Total 1876	C 1200	N 321	O 339	S 16	0	7	0
1	B	244	Total 1856	C 1183	N 319	O 338	S 16	0	5	0

- Molecule 2 is a protein called Trypsin inhibitor 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	C	14	Total 111	C 72	N 19	O 18	S 2	0	0	0
2	D	14	Total 111	C 72	N 19	O 18	S 2	0	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	4	TYR	THR	engineered mutation	UNP Q4GWU5
C	7	LYS	ILE	engineered mutation	UNP Q4GWU5
D	4	TYR	THR	engineered mutation	UNP Q4GWU5
D	7	LYS	ILE	engineered mutation	UNP Q4GWU5

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	147	Total 152	O 152	0	5
3	B	160	Total 163	O 163	0	3
3	C	5	Total 6	O 6	0	1
3	D	6	Total 6	O 6	0	0



## 4 Data and refinement statistics i

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	78.73Å 80.13Å 83.23Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	46.55 – 1.80 46.55 – 1.80	Depositor EDS
% Data completeness (in resolution range)	99.8 (46.55-1.80) 100.0 (46.55-1.80)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.18	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.02 (at 1.79Å)	Xtrriage
Refinement program	PHENIX	Depositor
R, $R_{free}$	0.189 , 0.216 0.190 , 0.216	Depositor DCC
$R_{free}$ test set	2468 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	14.3	Xtrriage
Anisotropy	0.894	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.37 , 48.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.55$ , $\langle L^2 \rangle = 0.39$	Xtrriage
Estimated twinning fraction	0.000 for k,h,-l	Xtrriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	4281	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	20.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 52.55 % 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 4.7846e-05. 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

### 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	0.36	0/1942	0.56	0/2644
1	B	0.39	0/1915	0.57	0/2609
2	C	0.41	0/115	0.52	0/154
2	D	0.37	0/115	0.56	0/154
All	All	0.38	0/4087	0.56	0/5561

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	1876	0	1839	13	0
1	B	1856	0	1807	14	0
2	C	111	0	109	0	0
2	D	111	0	109	0	0
3	A	152	0	0	1	0
3	B	163	0	0	0	0
3	C	6	0	0	0	0
3	D	6	0	0	0	0
All	All	4281	0	3864	27	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 (27) 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:580:ARG:HG3	1:B:617:ILE:HD13	1.78	0.65
1:A:577:VAL:HG13	1:A:616[B]:VAL:HG13	1.76	0.65
1:A:763:LEU:HD12	1:A:770[B]:LYS:HD2	1.82	0.62
1:A:577:VAL:CG1	1:A:616[B]:VAL:HG13	2.36	0.55
1:B:556[A]:LYS:HG2	1:B:557:LYS:O	2.07	0.55
1:A:577:VAL:HG22	1:A:618:LEU:CD2	2.38	0.54
1:B:556[B]:LYS:HB3	1:B:569:HIS:CD2	2.43	0.54
1:B:556[A]:LYS:HB2	1:B:569:HIS:CD2	2.46	0.49
1:A:710[B]:CYS:SG	1:A:716:LEU:HD12	2.54	0.47
1:A:599:LEU:HD21	1:A:647:ILE:HD11	1.98	0.46
1:B:616[A]:VAL:HG23	1:B:618:LEU:HD11	1.98	0.46
1:B:599:LEU:HD21	1:B:647:ILE:HD11	1.98	0.46
1:B:679:GLU:HB3	1:B:701:GLN:HE21	1.81	0.45
1:B:763:LEU:HD12	1:B:770:LYS:HD2	1.97	0.45
1:A:577:VAL:HG22	1:A:618:LEU:HD22	1.98	0.45
1:B:571:HIS:CE1	1:B:661:LYS:HD3	2.51	0.45
1:A:666:CYS:SG	1:A:752:LYS:HD3	2.57	0.45
1:B:759:THR:HA	1:B:774:TYR:CD2	2.52	0.44
1:B:710[A]:CYS:SG	1:B:716:LEU:HD12	2.58	0.44
1:A:785:GLU:HB3	1:A:789:ARG:NH1	2.33	0.43
1:B:757:GLY:HA2	1:B:775:VAL:O	2.19	0.43
1:B:651:LYS:HE2	1:B:791:ASN:O	2.18	0.42
1:B:576:GLN:NE2	1:B:683:THR:OG1	2.52	0.42
1:A:578:SER:HB3	1:A:617:ILE:HB	2.02	0.41
1:A:556:LYS:HB3	1:A:569:HIS:CE1	2.55	0.40
1:A:585:MET:HB2	3:A:940[B]:HOH:O	2.22	0.40
1:A:616[A]:VAL:HG21	1:A:652:LEU:HD22	2.04	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	247/246 (100%)	241 (98%)	6 (2%)	0	100	100
1	B	245/246 (100%)	241 (98%)	4 (2%)	0	100	100
2	C	12/14 (86%)	11 (92%)	1 (8%)	0	100	100
2	D	12/14 (86%)	11 (92%)	1 (8%)	0	100	100
All	All	516/520 (99%)	504 (98%)	12 (2%)	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	204/208 (98%)	202 (99%)	2 (1%)	78	74
1	B	201/208 (97%)	200 (100%)	1 (0%)	90	89
2	C	13/13 (100%)	12 (92%)	1 (8%)	14	4
2	D	13/13 (100%)	13 (100%)	0	100	100
All	All	431/442 (98%)	427 (99%)	4 (1%)	78	77

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

Mol	Chain	Res	Type
1	A	622	GLN
1	A	741	SER
1	B	558	CYS
2	C	2	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	622	GLN
1	B	576	GLN
1	B	701	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 carbohydrates 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, 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	A	244/246 (99%)	-0.17	3 (1%) 79 76	10, 18, 34, 58	0
1	B	244/246 (99%)	-0.13	4 (1%) 72 68	10, 18, 35, 67	0
2	C	14/14 (100%)	-0.08	0 100 100	14, 24, 32, 39	0
2	D	14/14 (100%)	0.00	0 100 100	15, 24, 31, 40	0
All	All	516/520 (99%)	-0.15	7 (1%) 75 72	10, 18, 34, 67	0

All (7) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	558	CYS	6.7
1	B	559	PRO	5.8
1	B	692	PHE	3.8
1	A	628	PRO	3.2
1	A	546	PHE	2.4
1	B	546	PHE	2.3
1	A	675	ALA	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 carbohydrates 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.