Full wwPDB X-ray Structure Validation Report ⓘ

Jun 26, 2024 – 01:27 AM EDT

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PDB ID	:	6R8X
Title	:	COAGULATION FACTOR XI CATALYTIC DOMAIN IN COMPLEX WITH FAB-PORTION OF MAA868
Authors	:	Schiering, N.; Koch, A.
Deposited on	:	2019-04-02
Resolution	:	2.04 Å(reported)

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 2.04 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.
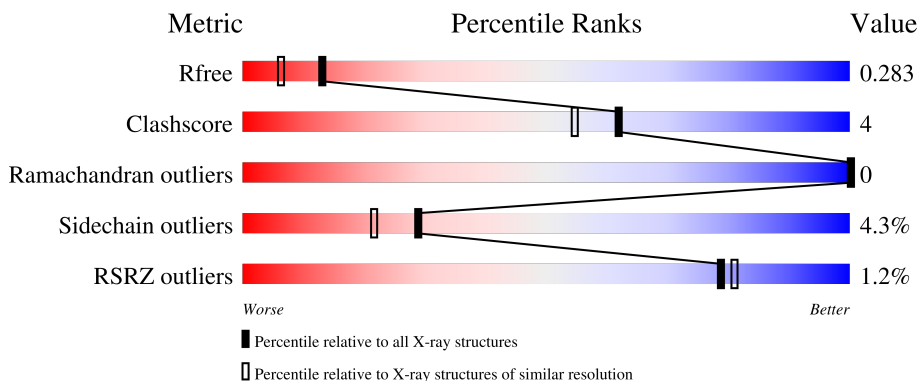
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1692 (2.04-2.04)
Clashscore	141614	1773 (2.04-2.04)
Ramachandran outliers	138981	1752 (2.04-2.04)
Sidechain outliers	138945	1752 (2.04-2.04)
RSRZ outliers	127900	1672 (2.04-2.04)

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 <=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	238	
2	B	216	
3	C	236	

2 Entity composition ⓘ

There are 4 unique types of molecules in this entry. The entry contains 5484 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 Coagulation factor XI.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	228	Total	C	N	O	S	0	6	0
			1852	1177	324	340	11			

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	123	SER	CYS	engineered mutation	UNP P03951

- Molecule 2 is a protein called anti-Factor-XI Fab fragment light chain MAA868.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	211	Total	C	N	O	S	0	1	0
			1579	988	265	322	4			

- Molecule 3 is a protein called anti-Factor-XI Fab fragment heavy chain MAA868.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	219	Total	C	N	O	S	0	2	0
			1640	1037	272	324	7			

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	132	Total	O	0	0
			132	132		
4	B	135	Total	O	0	0
			135	135		
4	C	146	Total	O	0	0
			146	146		

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 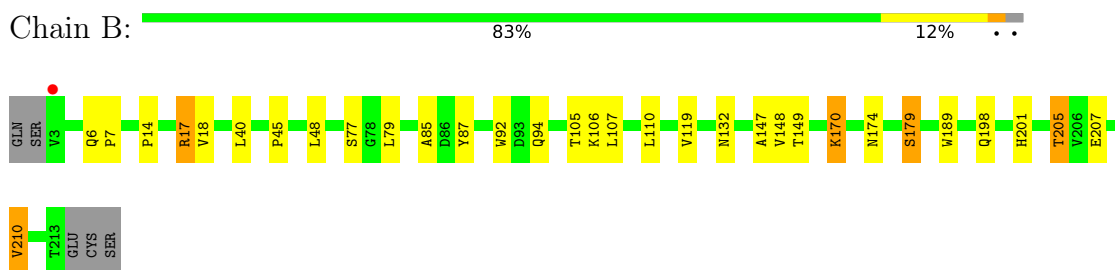(RSRZ > 2). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.
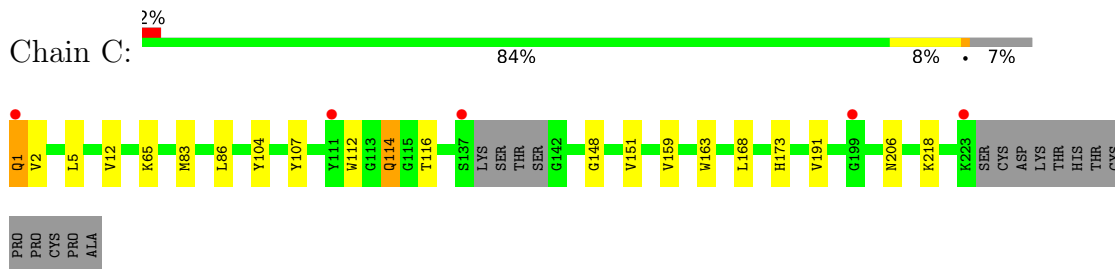
• Molecule 1: Coagulation factor XI
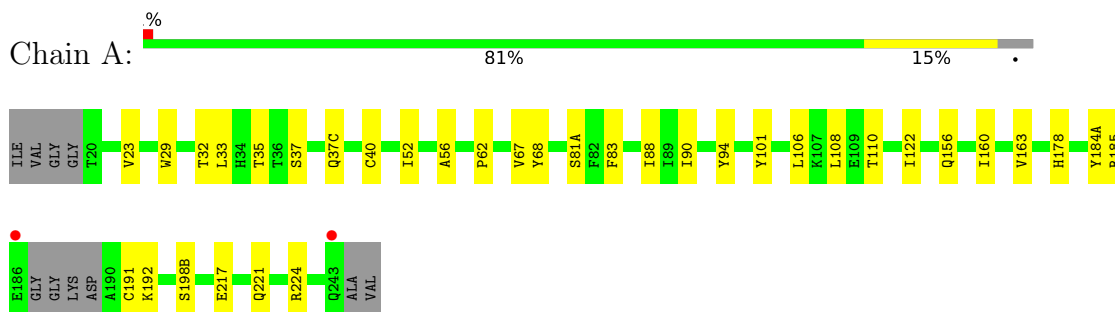
Chain A:

• Molecule 2: anti-Factor-XI Fab fragment light chain MAA868

Chain B:

• Molecule 3: anti-Factor-XI Fab fragment heavy chain MAA868

Chain C:

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	191.27Å 53.22Å 65.16Å 90.00° 94.56° 90.00°	Depositor
Resolution (Å)	64.90 – 2.04 64.96 – 2.04	Depositor EDS
% Data completeness (in resolution range)	95.9 (64.90-2.04) 95.6 (64.96-2.04)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.00 (at 2.03Å)	Xtriage
Refinement program	BUSTER 2.11.5	Depositor
R, R_{free}	0.220 , 0.282 0.221 , 0.283	Depositor DCC
R_{free} test set	2005 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å^2)	21.4	Xtriage
Anisotropy	0.169	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.27 , 37.7	EDS
L-test for twinning[2]	$< |L| > = 0.47$, $< L^2 > = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.92	EDS
Total number of atoms	5484	wwPDB-VP
Average B, all atoms (Å^2)	27.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.12% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< |L| >$, $< L^2 >$ 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	0.50	0/1915	0.76	1/2595 (0.0%)
2	B	0.50	0/1621	0.72	0/2214
3	C	0.51	0/1685	0.72	0/2293
All	All	0.51	0/5221	0.73	1/7102 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	37	SER	N-CA-CB	-5.17	102.75	110.50

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	1852	0	1836	17	0
2	B	1579	0	1532	21	0
3	C	1640	0	1600	7	0
4	A	132	0	0	1	0
4	B	135	0	0	2	0
4	C	146	0	0	1	0
All	All	5484	0	4968	44	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including

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hydrogen atoms). The all-atom clashscore for this structure is 4.

All (44) 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:217:GLU:HG3	1:A:224:ARG:HB2	1.42	0.97
2:B:119:VAL:HG11	4:B:305:HOH:O	1.85	0.77
2:B:7:PRO:O	2:B:105:THR:HG22	1.86	0.75
1:A:217:GLU:CG	1:A:224:ARG:HB2	2.16	0.74
2:B:205:THR:HG22	4:B:335:HOH:O	1.95	0.66
2:B:170:LYS:HE2	2:B:174:ASN:HA	1.79	0.64
1:A:110:THR:HG22	4:A:363:HOH:O	1.97	0.63
1:A:56:ALA:HB1	1:A:90:ILE:HG23	1.83	0.60
2:B:198:GLN:HG2	2:B:207:GLU:HG3	1.82	0.60
2:B:179:SER:HB2	4:C:314:HOH:O	2.01	0.58
1:A:33[B]:LEU:HD12	1:A:40[B]:CYS:SG	2.44	0.58
1:A:35:THR:O	1:A:37(C):GLN:HA	2.04	0.57
1:A:160:ILE:HD11	1:A:191:CYS:SG	2.45	0.56
1:A:52:ILE:HB	1:A:106:LEU:HB2	1.92	0.52
3:C:5:LEU:HA	3:C:114:GLN:HE22	1.75	0.52
3:C:83:MET:HE2	3:C:86:LEU:HD21	1.90	0.52
2:B:189:TRP:HH2	2:B:210:VAL:HG13	1.77	0.50
1:A:33[B]:LEU:HD22	1:A:67:VAL:HG22	1.94	0.49
2:B:92:TRP:HE1	2:B:94:GLN:NE2	2.11	0.48
2:B:14:PRO:HD3	2:B:110:LEU:O	2.14	0.48
1:A:94:TYR:HB2	1:A:101:TYR:O	2.13	0.47
3:C:1:GLN:HB3	3:C:2:VAL:H	1.58	0.47
1:A:32:THR:HG23	1:A:68:TYR:HB2	1.98	0.46
1:A:83:PHE:HB3	1:A:108:LEU:HD13	1.97	0.45
2:B:6:GLN:HE21	2:B:105:THR:HG23	1.81	0.45
3:C:151:VAL:HG11	3:C:159:VAL:HG11	1.99	0.45
2:B:40:LEU:HD23	2:B:85:ALA:HB2	1.98	0.44
2:B:6:GLN:NE2	2:B:105:THR:HG23	2.33	0.44
2:B:79:LEU:HD11	2:B:107:LEU:HD21	1.99	0.43
3:C:148:GLY:HA2	3:C:163:TRP:CH2	2.52	0.43
2:B:45:PRO:HD2	3:C:112:TRP:CE3	2.53	0.43
2:B:18:VAL:HG11	2:B:107:LEU:HD13	2.01	0.42
2:B:147:ALA:O	2:B:201:HIS:HD2	2.02	0.42
1:A:56:ALA:CB	1:A:90:ILE:HG23	2.48	0.42
1:A:29:TRP:CE2	1:A:122:ILE:HD12	2.54	0.41
1:A:62:PRO:HG3	1:A:88:ILE:HG13	2.02	0.41
1:A:156:GLN:HB2	1:A:192:LYS:HB2	2.03	0.41
1:A:184(A):TYR:HA	1:A:221:GLN:HA	2.02	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:17:ARG:HD3	2:B:77:SER:OG	2.20	0.41
2:B:48:LEU:HD11	2:B:87:TYR:HE1	1.86	0.40
2:B:106:LYS:HD2	2:B:106:LYS:HA	1.93	0.40
2:B:170:LYS:HE2	2:B:174:ASN:HD22	1.85	0.40
3:C:168:LEU:HD21	3:C:191:VAL:HG21	2.03	0.40
2:B:189:TRP:CH2	2:B:210:VAL:HG13	2.57	0.40

There are no symmetry-related clashes.

5.3   Torsion angles ⓘ

5.3.1   Protein backbone ⓘ

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	230/238 (97%)	223 (97%)	7 (3%)	0	100	100
2	B	210/216 (97%)	205 (98%)	5 (2%)	0	100	100
3	C	217/236 (92%)	213 (98%)	4 (2%)	0	100	100
All	All	657/690 (95%)	641 (98%)	16 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	A	205/204 (100%)	199 (97%)	6 (3%)	42	35

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	B	179/183 (98%)	171 (96%)	8 (4%)	27	20
3	C	183/197 (93%)	173 (94%)	10 (6%)	21	13
All	All	567/584 (97%)	543 (96%)	24 (4%)	29	22

All (24) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	23	VAL
1	A	81(A)	SER
1	A	163	VAL
1	A	178	HIS
1	A	185	ARG
1	A	198(B)	SER
2	B	17	ARG
2	B	132	ASN
2	B	148	VAL
2	B	149	THR
2	B	170	LYS
2	B	179	SER
2	B	205	THR
2	B	210	VAL
3	C	1	GLN
3	C	12	VAL
3	C	65	LYS
3	C	104	TYR
3	C	107	TYR
3	C	114	GLN
3	C	116	THR
3	C	173	HIS
3	C	206	ASN
3	C	218	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	37(C)	GLN
1	A	73	ASN
1	A	204	HIS
2	B	94	GLN
2	B	112	GLN

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Mol	Chain	Res	Type
2	B	174	ASN
2	B	188	GLN
2	B	192	HIS
3	C	114	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 ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

There are no ligands in this entry.

5.7 Other polymers ⓘ

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	228/238 (95%)	-0.15	2 (0%)	84	86	14, 26, 45, 87	2 (0%)
2	B	211/216 (97%)	-0.17	1 (0%)	91	92	11, 25, 45, 77	0
3	C	219/236 (92%)	-0.16	5 (2%)	60	64	10, 22, 43, 88	0
All	All	658/690 (95%)	-0.16	8 (1%)	79	81	10, 24, 45, 88	2 (0%)

All (8) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	C	137	SER	3.1
1	A	186	GLU	2.9
1	A	243	GLN	2.7
3	C	223	LYS	2.6
2	B	3	VAL	2.6
3	C	1	GLN	2.5
3	C	111	TYR	2.4
3	C	199	GLY	2.3

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

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

There are no ligands in this entry.

6.5 Other polymers (i)

There are no such residues in this entry.