Full wwPDB X-ray Structure Validation Report ⓘ

May 13, 2020 – 03:22 am BST

PDB ID	:	1CSG
Title	:	Three-dimensional structure of recombinant human granulocyte-macrophage colony-stimulating factor
Authors	:	Walter, M.R.; Cook, W.J.; Ealick, S.E.
Deposited on	:	1992-11-23
Resolution	:	2.70 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 following versions of software and data (see references ⓘ) were used in the production of this report:

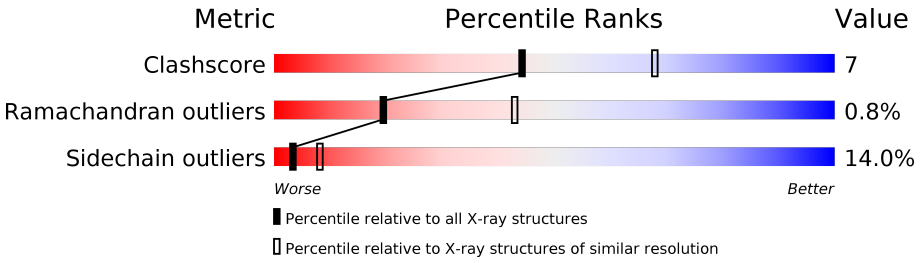
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.70 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	3122 (2.70-2.70)
Ramachandran outliers	138981	3069 (2.70-2.70)
Sidechain outliers	138945	3069 (2.70-2.70)

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 >=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%

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	127	68% 24% 6%
1	B	127	65% 27% 6%

2 Entry composition (i)

There is only 1 type of molecule in this entry. The entry contains 1920 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 Granulocyte-macrophage colony-stimulating factor.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	120	Total	C	N	O	S	0	0	0
			960	607	160	185	8			
1	B	120	Total	C	N	O	S	0	0	0
			960	607	160	185	8			

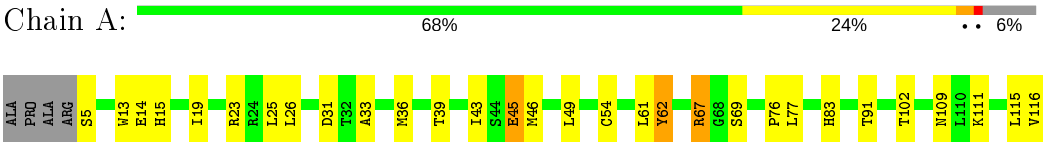
3 Residue-property plots (i)

These plots are drawn for all protein, RNA and DNA 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. 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. 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.

Note EDS was not executed.

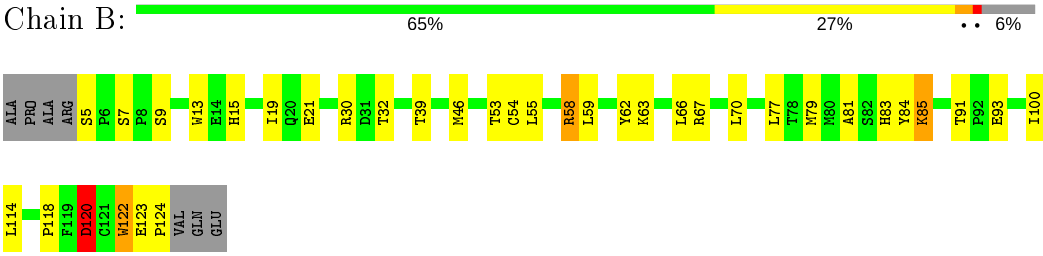
- Molecule 1: Granulocyte-macrophage colony-stimulating factor

Chain A:



- Molecule 1: Granulocyte-macrophage colony-stimulating factor

Chain B:



4 Data and refinement statistics (i)

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

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	46.60Å 58.80Å 126.90Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	(Not available) – 2.70	Depositor
% Data completeness (in resolution range)	(Not available) ((Not available)-2.70)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	X-PLOR	Depositor
R, R_{free}	0.254 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	1920	wwPDB-VP
Average B, all atoms (Å^2)	15.0	wwPDB-VP

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	0.83	0/983	1.53	10/1336 (0.7%)
1	B	0.84	0/983	1.58	14/1336 (1.0%)
All	All	0.83	0/1966	1.56	24/2672 (0.9%)

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	1
1	B	0	1
All	All	0	2

There are no bond length outliers.

All (24) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	13	TRP	CD1-CG-CD2	9.18	113.64	106.30
1	A	67	ARG	NE-CZ-NH1	8.39	124.50	120.30
1	A	13	TRP	CD1-CG-CD2	8.31	112.95	106.30
1	B	58	ARG	NE-CZ-NH2	-8.01	116.30	120.30
1	B	13	TRP	CE2-CD2-CG	-7.68	101.15	107.30
1	B	122	TRP	CD1-CG-CD2	7.61	112.39	106.30
1	B	67	ARG	NE-CZ-NH1	7.59	124.10	120.30
1	A	13	TRP	CE2-CD2-CG	-7.53	101.28	107.30
1	B	122	TRP	CE2-CD2-CG	-7.37	101.41	107.30
1	B	62	TYR	CB-CG-CD2	-7.15	116.71	121.00
1	A	122	TRP	CD1-CG-CD2	6.34	111.38	106.30
1	B	13	TRP	CG-CD1-NE1	-6.08	104.02	110.10
1	A	122	TRP	CE2-CD2-CG	-6.07	102.45	107.30
1	A	115	LEU	CA-CB-CG	5.96	129.00	115.30

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	23	ARG	NE-CZ-NH2	-5.91	117.34	120.30
1	A	62	TYR	CB-CG-CD2	-5.81	117.51	121.00
1	B	107	LYS	CA-C-N	5.46	129.22	117.20
1	B	30	ARG	NE-CZ-NH2	-5.33	117.64	120.30
1	B	13	TRP	CB-CG-CD1	-5.31	120.09	127.00
1	A	13	TRP	CG-CD1-NE1	-5.30	104.80	110.10
1	B	122	TRP	CG-CD1-NE1	-5.25	104.84	110.10
1	A	13	TRP	CG-CD2-CE3	5.22	138.60	133.90
1	B	13	TRP	CG-CD2-CE3	5.13	138.52	133.90
1	B	120	ASP	CA-C-N	5.05	128.32	117.20

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	123	GLU	Peptide
1	B	123	GLU	Peptide

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	960	0	942	8	0
1	B	960	0	942	17	0
All	All	1920	0	1884	25	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 7.

All (25) 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:33:ALA:HA	1:A:36:MET:SD	2.03	0.97
1:B:46:MET:HA	1:B:58:ARG:HH22	1.35	0.89
1:A:33:ALA:CA	1:A:36:MET:SD	2.84	0.62

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:122:TRP:HD1	1:B:124:PRO:CD	2.12	0.61
1:A:83:HIS:HE1	1:A:120:ASP:HA	1.66	0.60
1:B:83:HIS:HE1	1:B:120:ASP:HA	1.67	0.59
1:B:46:MET:HA	1:B:58:ARG:NH2	2.14	0.59
1:B:55:LEU:HB3	1:B:91:THR:HG21	1.86	0.56
1:B:53:THR:HG22	1:B:54:CYS:SG	2.48	0.53
1:B:122:TRP:HD1	1:B:124:PRO:HD3	1.72	0.53
1:B:122:TRP:HD1	1:B:124:PRO:HD2	1.75	0.51
1:B:5:SER:N	1:B:7:SER:HG	2.08	0.51
1:B:83:HIS:CE1	1:B:120:ASP:HA	2.49	0.48
1:A:15:HIS:HE1	1:A:118:PRO:O	1.97	0.47
1:B:15:HIS:CE1	1:B:19:ILE:HD11	2.50	0.46
1:B:122:TRP:CD1	1:B:124:PRO:HD3	2.50	0.46
1:A:62:TYR:OH	1:A:109:ASN:ND2	2.51	0.44
1:A:43:ILE:HG22	1:A:45:GLU:H	1.84	0.43
1:B:91:THR:HG23	1:B:93:GLU:OE2	2.19	0.42
1:B:55:LEU:HD21	1:B:84:TYR:CD2	2.55	0.42
1:B:39:THR:HB	1:B:100:ILE:HG23	2.03	0.41
1:B:59:LEU:O	1:B:63:LYS:HG3	2.20	0.41
1:A:83:HIS:CE1	1:A:120:ASP:HA	2.51	0.41
1:B:81:ALA:O	1:B:85:LYS:HB2	2.21	0.40
1:A:19:ILE:HG21	1:A:19:ILE:HD13	1.87	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	118/127 (93%)	110 (93%)	6 (5%)	2 (2%)	9 23
1	B	118/127 (93%)	109 (92%)	9 (8%)	0	100 100
All	All	236/254 (93%)	219 (93%)	15 (6%)	2 (1%)	19 43

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	54	CYS
1	A	123	GLU

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	111/116 (96%)	92 (83%)	19 (17%)	2 5
1	B	111/116 (96%)	99 (89%)	12 (11%)	6 15
All	All	222/232 (96%)	191 (86%)	31 (14%)	3 8

All (31) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	5	SER
1	A	14	GLU
1	A	25	LEU
1	A	26	LEU
1	A	31	ASP
1	A	39	THR
1	A	45	GLU
1	A	46	MET
1	A	49	LEU
1	A	61	LEU
1	A	67	ARG
1	A	69	SER
1	A	76	PRO
1	A	77	LEU
1	A	91	THR
1	A	102	THR
1	A	111	LYS
1	A	116	VAL
1	A	123	GLU
1	B	9	SER
1	B	21	GLU

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	B	32	THR
1	B	66	LEU
1	B	70	LEU
1	B	77	LEU
1	B	79	MET
1	B	85	LYS
1	B	108	GLU
1	B	114	LEU
1	B	118	PRO
1	B	120	ASP

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	15	HIS
1	A	37	ASN
1	A	83	HIS
1	A	109	ASN
1	B	15	HIS
1	B	83	HIS

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

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

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.