



Full wwPDB X-ray Structure Validation Report

Feb 28, 2014 – 07:53 AM GMT

PDB ID : 1HNG
Title : CRYSTAL STRUCTURE AT 2.8 ANGSTROMS RESOLUTION OF A SOLUBLE FORM OF THE CELL ADHESION MOLECULE CD2
Authors : Jones, E.Y.; Davis, S.J.; Williams, A.F.; Harlos, K.; Stuart, D.I.
Deposited on : 1994-08-10
Resolution : 2.80 Å(reported)

This is a full wwPDB validation report for a publicly released PDB entry.
We welcome your comments at validation@mail.wwpdb.org
A user guide is available at <http://wwpdb.org/ValidationPDFNotes.html>

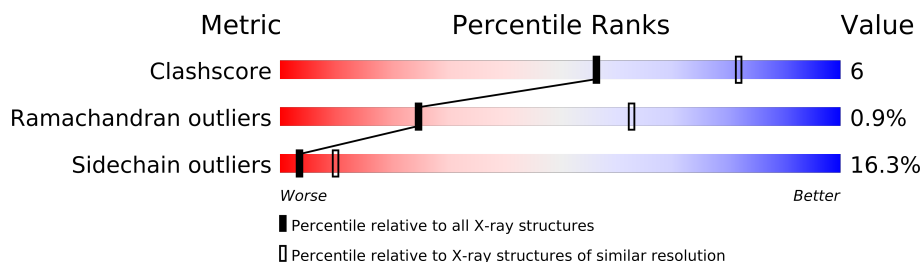
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.15 2013
Xtriage (Phenix) : **NOT EXECUTED**
EDS : **NOT EXECUTED**
Percentile statistics : 21963
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP) : stable22683

1 Overall quality at a glance

The reported resolution of this entry is 2.80 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))
Clashscore	79885	2295 (2.80-2.80)
Ramachandran outliers	78287	2252 (2.80-2.80)
Sidechain outliers	78261	2254 (2.80-2.80)

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 ≥ 3 , 2, 1 and 0 types of geometric quality criteria. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	176	
1	B	176	

2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 2796 atoms, of which 0 are hydrogen and 0 are deuterium.

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 CD2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	175	Total	C	N	O	S	0	0	0
			1398	877	243	268	10			
1	B	175	Total	C	N	O	S	0	0	0
			1398	877	243	268	10			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	90	ASN	ASP	CONFLICT	UNP P08921
B	90	ASN	ASP	CONFLICT	UNP P08921

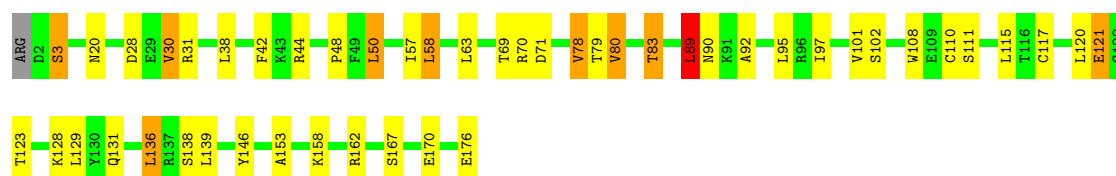
3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

Note EDS was not executed.

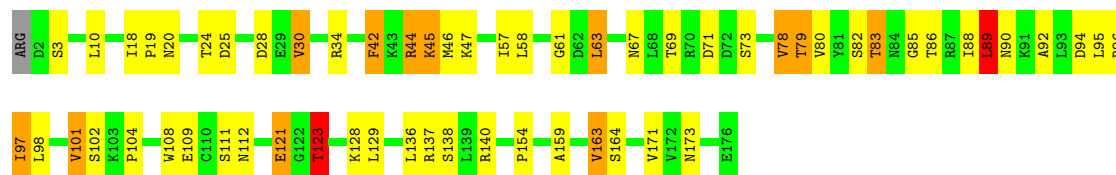
• Molecule 1: CD2

Chain A: 



• Molecule 1: CD2

Chain B: 



4 Data and refinement statistics

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

Property	Value	Source
Space group	P 41 21 2	Depositor
Cell constants a, b, c, α , β , γ	111.40Å 111.40Å 86.90Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 2.80	Depositor
% Data completeness (in resolution range)	(Not available) (20.00-2.80)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	X-PLOR	Depositor
R, R_{free}	0.215 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	2796	wwPDB-VP
Average B, all atoms (Å ²)	29.0	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	0.72	0/1422	1.47	10/1918 (0.5%)
1	B	0.72	0/1422	1.51	12/1918 (0.6%)
All	All	0.72	0/2844	1.49	22/3836 (0.6%)

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	B	0	1

There are no bond length outliers.

All (22) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	78	VAL	CG1-CB-CG2	7.49	122.89	110.90
1	B	78	VAL	CB-CA-C	-7.37	97.40	111.40
1	A	78	VAL	CB-CA-C	-6.80	98.48	111.40
1	B	137	ARG	NE-CZ-NH1	6.74	123.67	120.30
1	B	101	VAL	N-CA-CB	-6.54	97.12	111.50
1	A	162	ARG	NE-CZ-NH2	-6.34	117.13	120.30
1	B	140	ARG	NE-CZ-NH1	6.25	123.43	120.30
1	A	80	VAL	CG1-CB-CG2	-6.12	101.11	110.90
1	A	89	LEU	CA-CB-CG	6.12	129.38	115.30
1	A	44	ARG	CA-C-N	6.08	130.56	117.20
1	B	123	THR	N-CA-CB	-5.85	99.19	110.30
1	B	78	VAL	CA-CB-CG1	-5.84	102.15	110.90
1	A	117	CYS	CA-CB-SG	-5.80	103.56	114.00
1	A	70	ARG	NE-CZ-NH2	-5.69	117.46	120.30
1	B	96	ARG	NE-CZ-NH1	5.43	123.02	120.30
1	B	163	VAL	N-CA-CB	-5.40	99.62	111.50

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	34	ARG	NE-CZ-NH2	-5.35	117.63	120.30
1	B	89	LEU	CA-CB-CG	5.34	127.57	115.30
1	A	58	LEU	CB-CG-CD2	-5.17	102.22	111.00
1	A	50	LEU	CA-CB-CG	5.11	127.05	115.30
1	B	45	LYS	CA-CB-CG	5.08	124.57	113.40
1	A	176	GLU	N-CA-C	-5.00	97.49	111.00

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	42	PHE	Sidechain

5.2 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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1398	0	1392	13	0
1	B	1398	0	1392	25	0
All	All	2796	0	2784	36	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 6.

All (36) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:B:3:SER:HA	1:B:92:ALA:O	1.79	0.83
1:B:30:VAL:HG13	1:B:42:PHE:HB3	1.71	0.71
1:B:102:SER:HB3	1:B:121:GLU:HB2	1.78	0.65
1:A:69:THR:HG22	1:A:71:ASP:H	1.63	0.64
1:B:128:LYS:HD3	1:B:138:SER:OG	2.01	0.61
1:A:110:CYS:SG	1:B:173:ASN:ND2	2.78	0.57
1:B:18:ILE:HD11	1:B:61:GLY:O	2.05	0.57
1:B:98:LEU:HD22	1:B:123:THR:HG22	1.87	0.56
1:B:104:PRO:HG3	1:B:159:ALA:HB2	1.85	0.56

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:102:SER:HB3	1:A:121:GLU:HB2	1.89	0.54
1:B:25:ASP:HA	1:B:44:ARG:NH1	2.22	0.54
1:A:80:VAL:HG12	1:A:89:LEU:HD22	1.90	0.52
1:B:69:THR:HG22	1:B:71:ASP:H	1.74	0.52
1:B:25:ASP:HA	1:B:44:ARG:HH12	1.75	0.51
1:B:28:ASP:HB2	1:B:83:THR:HA	1.93	0.51
1:A:30:VAL:HG13	1:A:42:PHE:HB3	1.96	0.48
1:A:128:LYS:HD3	1:A:138:SER:OG	2.14	0.47
1:B:10:LEU:HD13	1:B:97:ILE:HD11	1.96	0.47
1:B:109:GLU:HB3	1:B:112:ASN:OD1	2.14	0.47
1:B:101:VAL:HB	1:B:164:SER:OG	2.16	0.45
1:A:136:LEU:HG	1:A:146:TYR:CZ	2.52	0.45
1:B:154:PRO:HG3	1:B:171:VAL:HG12	1.99	0.45
1:B:73:SER:HB3	1:B:97:ILE:HG23	1.99	0.44
1:B:80:VAL:CG1	1:B:89:LEU:HB3	2.48	0.44
1:A:3:SER:HA	1:A:92:ALA:O	2.19	0.43
1:B:79:THR:HA	1:B:89:LEU:O	2.18	0.43
1:B:80:VAL:HG12	1:B:89:LEU:HD22	2.00	0.43
1:A:139:LEU:HA	1:A:139:LEU:HD23	1.77	0.43
1:B:82:SER:CB	1:B:88:ILE:HD11	2.49	0.42
1:B:46:MET:HG2	1:B:47:LYS:O	2.19	0.42
1:A:28:ASP:HB2	1:A:83:THR:HA	2.03	0.41
1:B:18:ILE:HA	1:B:19:PRO:HD3	1.80	0.41
1:A:30:VAL:CG1	1:A:42:PHE:HB3	2.51	0.40
1:A:108:TRP:O	1:B:171:VAL:CG2	2.69	0.40
1:A:131:GLN:HG2	1:A:153:ALA:HB3	2.03	0.40
1:B:63:LEU:HD23	1:B:63:LEU:HA	1.93	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	173/176 (98%)	168 (97%)	5 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	173/176 (98%)	166 (96%)	4 (2%)	3 (2%)	14	42
All	All	346/352 (98%)	334 (96%)	9 (3%)	3 (1%)	25	63

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	44	ARG
1	B	85	GLY
1	B	20	ASN

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	156/157 (99%)	128 (82%)	28 (18%)	2	7
1	B	156/157 (99%)	133 (85%)	23 (15%)	4	13
All	All	312/314 (99%)	261 (84%)	51 (16%)	3	10

All (51) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	3	SER
1	A	20	ASN
1	A	30	VAL
1	A	31	ARG
1	A	38	LEU
1	A	48	PRO
1	A	50	LEU
1	A	57	ILE
1	A	58	LEU
1	A	63	LEU
1	A	78	VAL
1	A	79	THR
1	A	83	THR
1	A	89	LEU
1	A	90	ASN

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Mol	Chain	Res	Type
1	A	95	LEU
1	A	97	ILE
1	A	101	VAL
1	A	111	SER
1	A	115	LEU
1	A	120	LEU
1	A	121	GLU
1	A	123	THR
1	A	129	LEU
1	A	136	LEU
1	A	158	LYS
1	A	167	SER
1	A	170	GLU
1	B	24	THR
1	B	30	VAL
1	B	45	LYS
1	B	57	ILE
1	B	58	LEU
1	B	63	LEU
1	B	67	ASN
1	B	78	VAL
1	B	79	THR
1	B	83	THR
1	B	86	THR
1	B	89	LEU
1	B	90	ASN
1	B	94	ASP
1	B	95	LEU
1	B	97	ILE
1	B	108	TRP
1	B	111	SER
1	B	121	GLU
1	B	123	THR
1	B	129	LEU
1	B	136	LEU
1	B	163	VAL

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	20	ASN
1	A	77	ASN

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Mol	Chain	Res	Type
1	A	90	ASN

5.3.3 RNA ⓘ

There are no RNA chains 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 carbohydrates 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 ⓘ

EDS was not executed - this section will therefore be empty.

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

EDS was not executed - this section will therefore be empty.

6.3 Carbohydrates ⓘ

EDS was not executed - this section will therefore be empty.

6.4 Ligands ⓘ

EDS was not executed - this section will therefore be empty.

6.5 Other polymers ⓘ

EDS was not executed - this section will therefore be empty.