Full wwPDB NMR Structure Validation Report (i)

Apr 26, 2016 – 01:48 PM BST

PDB ID	:	1C7U
Title	:	Complex of the DNA binding core domain of the transcription factor MEF2A with a 20mer oligonucleotide
Authors	:	Clore, G.M.; Huang, K.
Deposited on	:	2000-03-17

This is a Full wwPDB NMR Structure 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/validation/2016/NMRValidationReportHelp
with specific help available everywhere you see the (i) symbol.

The following versions of software and data (see references (1)) were used in the production of this report:

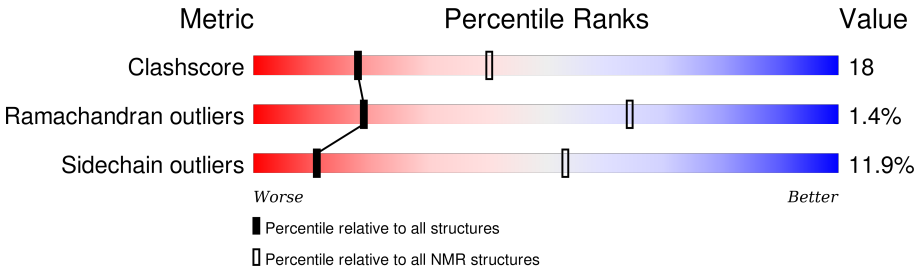
Cyrange	:	Kirchner and Güntert (2011)
NmrClust	:	Kelley et al. (1996)
MolProbity	:	4.02b-467
Mogul	:	unknown
Percentile statistics	:	20151230.v01 (using entries in the PDB archive December 30th 2015)
RCI	:	v_1n_11_5_13_A (Berjanski et al., 2005)
PANAV	:	Wang et al. (2010)
ShiftChecker	:	rb-20027457
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	rb-20027457

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
SOLUTION NMR

The overall completeness of chemical shifts assignment was not calculated.

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)	NMR archive (#Entries)
Clashscore	114402	11133
Ramachandran outliers	111179	9975
Sidechain outliers	111093	9958

The table below summarises the geometric issues observed across the polymeric chains and their fit to the experimental data. The red, orange, yellow and green segments indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria. A cyan segment indicates the fraction of residues that are not part of the well-defined cores, and 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%

Mol	Chain	Length	Quality of chain
1	C	20	75% 25%
1	D	20	75% 25%
2	A	85	47% 33% 7% 13%
2	B	85	45% 33% 9% 13%

2 Ensemble composition and analysis

This entry contains 1 models. Identification of well-defined residues and clustering analysis are not possible.

3 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 3772 atoms, of which 1734 are hydrogens and 0 are deuteriums.

- Molecule 1 is a DNA chain called 5'-D(*CP*TP*CP*GP*GP*CP*TP*AP*TP*TP*AP*AP *TP*AP*GP*CP*CP*GP*AP*G)-3'.

Mol	Chain	Residues	Atoms						Trace
1	C	20	Total	C	H	N	O	P	0
			634	195	227	75	118	19	
1	D	20	Total	C	H	N	O	P	0
			634	195	227	75	118	19	

- Molecule 2 is a protein called MYOCYTE-SPECIFIC ENHANCER FACTOR 2A, C4 FORM.

Mol	Chain	Residues	Atoms						Trace
2	A	74	Total	C	H	N	O	S	0
			1252	392	640	105	112	3	
2	B	74	Total	C	H	N	O	S	0
			1252	392	640	105	112	3	

There are 4 discrepancies between the modelled and reference sequences:

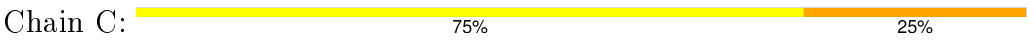
Chain	Residue	Modelled	Actual	Comment	Reference
A	38	ALA	CYS	CONFLICT	UNP Q02078
A	40	ALA	CYS	CONFLICT	UNP Q02078
B	138	ALA	CYS	CONFLICT	UNP Q02078
B	140	ALA	CYS	CONFLICT	UNP Q02078

4 Residue-property plots (i)

These plots are provided for all protein, RNA and DNA chains in the entry. The first graphic is the same as shown in the summary in section 1 of this report. The second graphic shows the sequence where residues are colour-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 outliers are shown as green connectors. Residues which are classified as ill-defined in the NMR ensemble, are shown in cyan with an underline colour-coded according to the previous scheme. Residues which were present in the experimental sample, but not modelled in the final structure are shown in grey.

• Molecule 1: 5'-D(*CP*TP*CP*GP*GP*CP*TP*AP*TP*TP*AP*AP*TP*AP*GP*CP*CP*GP*AP*G)-3'

Chain C:

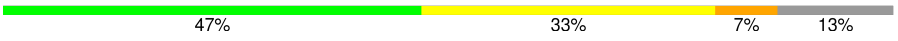


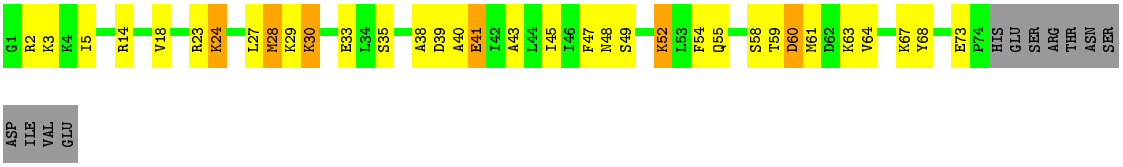
• Molecule 1: 5'-D(*CP*TP*CP*GP*GP*CP*TP*AP*TP*TP*AP*AP*TP*AP*GP*CP*CP*GP*AP*G)-3'

Chain D:

• Molecule 2: MYOCYTE-SPECIFIC ENHANCER FACTOR 2A, C4 FORM

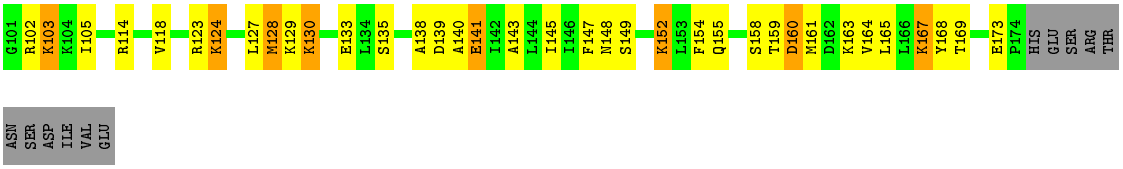
Chain A:





• Molecule 2: MYOCYTE-SPECIFIC ENHANCER FACTOR 2A, C4 FORM

Chain B:



5 Refinement protocol and experimental data overview

The models were refined using the following method: *SIMULATED ANNEALING*.

Of the 35 calculated structures, 1 were deposited, based on the following criterion: *REGULARIZED MEAN STRUCTURE*.

The following table shows the software used for structure solution, optimisation and refinement.

Software name	Classification	Version
X-PLOR/CNS	refinement	
CNS/X-PLOR	structure solution	

No chemical shift data was provided. No validations of the models with respect to experimental NMR restraints is performed at this time.

6 Model quality

6.1 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 (average) 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	C	1.44	5/456 (1.1%)	2.23	36/702 (5.1%)
1	D	1.44	5/456 (1.1%)	2.22	35/702 (5.0%)
2	A	1.08	0/620 (0.0%)	0.90	0/828 (0.0%)
2	B	1.09	0/620 (0.0%)	0.90	0/828 (0.0%)
All	All	1.25	10/2152 (0.5%)	1.65	71/3060 (2.3%)

All bond outliers are listed below. They are sorted according to the Z-score.

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	229	DT	C5-C7	6.29	1.53	1.50
1	C	209	DT	C5-C7	6.29	1.53	1.50
1	D	230	DT	C5-C7	6.20	1.53	1.50
1	C	210	DT	C5-C7	6.10	1.53	1.50
1	C	202	DT	C5-C7	5.67	1.53	1.50
1	C	213	DT	C5-C7	5.63	1.53	1.50
1	D	222	DT	C5-C7	5.56	1.53	1.50
1	D	233	DT	C5-C7	5.49	1.53	1.50
1	D	227	DT	C5-C7	5.32	1.53	1.50
1	C	207	DT	C5-C7	5.24	1.53	1.50

All angle outliers are listed below. They are sorted according to the Z-score.

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	D	231	DA	C4'-C3'-C2'	9.46	111.61	103.10
1	C	211	DA	C4'-C3'-C2'	9.34	111.50	103.10
1	C	210	DT	C4'-C3'-C2'	8.86	111.07	103.10
1	D	230	DT	C4'-C3'-C2'	8.85	111.06	103.10
1	D	232	DA	C4'-C3'-C2'	8.71	110.94	103.10
1	C	212	DA	C4'-C3'-C2'	8.69	110.92	103.10
1	D	224	DG	C4'-C3'-C2'	8.65	110.88	103.10
1	C	204	DG	C4'-C3'-C2'	8.60	110.84	103.10
1	C	201	DC	C4'-C3'-C2'	8.42	110.68	103.10
1	D	221	DC	C4'-C3'-C2'	8.39	110.65	103.10

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	D	233	DT	C4'-C3'-C2'	8.18	110.46	103.10
1	C	213	DT	C4'-C3'-C2'	8.16	110.44	103.10
1	D	229	DT	C4'-C3'-C2'	7.98	110.28	103.10
1	D	226	DC	C4'-C3'-C2'	7.97	110.27	103.10
1	C	206	DC	C4'-C3'-C2'	7.95	110.25	103.10
1	C	209	DT	C4'-C3'-C2'	7.93	110.24	103.10
1	C	215	DG	C4'-C3'-C2'	7.91	110.22	103.10
1	D	235	DG	C4'-C3'-C2'	7.87	110.18	103.10
1	C	203	DC	C4'-C3'-C2'	7.82	110.14	103.10
1	D	223	DC	C4'-C3'-C2'	7.76	110.08	103.10
1	C	207	DT	C4'-C3'-C2'	7.73	110.06	103.10
1	D	227	DT	C4'-C3'-C2'	7.72	110.05	103.10
1	C	217	DC	C4'-C3'-C2'	7.61	109.95	103.10
1	D	237	DC	C4'-C3'-C2'	7.58	109.92	103.10
1	C	214	DA	C4'-C3'-C2'	7.55	109.90	103.10
1	D	234	DA	C4'-C3'-C2'	7.54	109.89	103.10
1	D	236	DC	C4'-C3'-C2'	7.23	109.61	103.10
1	D	238	DG	C4'-C3'-C2'	7.21	109.59	103.10
1	C	218	DG	C4'-C3'-C2'	7.20	109.58	103.10
1	C	216	DC	C4'-C3'-C2'	7.20	109.58	103.10
1	D	222	DT	C4'-C3'-C2'	7.10	109.49	103.10
1	C	202	DT	C4'-C3'-C2'	7.07	109.47	103.10
1	D	225	DG	C4'-C3'-C2'	6.96	109.37	103.10
1	C	205	DG	C4'-C3'-C2'	6.94	109.35	103.10
1	C	219	DA	C4'-C3'-C2'	6.85	109.26	103.10
1	D	239	DA	C4'-C3'-C2'	6.81	109.23	103.10
1	C	208	DA	C4'-C3'-C2'	6.54	108.99	103.10
1	D	228	DA	C4'-C3'-C2'	6.53	108.98	103.10
1	D	240	DG	C4'-C3'-C2'	6.16	108.64	103.10
1	C	220	DG	C4'-C3'-C2'	6.14	108.62	103.10
1	C	213	DT	O4'-C1'-C2'	5.94	110.65	105.90
1	C	213	DT	C6-C5-C7	-5.93	119.34	122.90
1	D	233	DT	C6-C5-C7	-5.93	119.34	122.90
1	D	233	DT	O4'-C1'-C2'	5.90	110.62	105.90
1	D	221	DC	O4'-C1'-C2'	5.80	110.54	105.90
1	D	224	DG	O4'-C1'-C2'	5.76	110.51	105.90
1	C	201	DC	O4'-C1'-C2'	5.76	110.51	105.90
1	C	204	DG	O4'-C1'-C2'	5.75	110.50	105.90
1	C	210	DT	O4'-C1'-C2'	5.72	110.48	105.90
1	D	230	DT	O4'-C1'-C2'	5.72	110.47	105.90
1	D	234	DA	O3'-P-O5'	-5.61	93.34	104.00
1	C	214	DA	O3'-P-O5'	-5.59	93.37	104.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	D	229	DT	O4'-C1'-C2'	5.51	110.31	105.90
1	C	209	DT	O4'-C1'-C2'	5.47	110.27	105.90
1	D	225	DG	O4'-C1'-C2'	5.35	110.18	105.90
1	C	207	DT	C6-C5-C7	-5.33	119.70	122.90
1	C	205	DG	O4'-C1'-C2'	5.32	110.16	105.90
1	D	227	DT	C6-C5-C7	-5.32	119.71	122.90
1	C	219	DA	N1-C2-N3	-5.24	126.68	129.30
1	D	228	DA	N1-C2-N3	-5.24	126.68	129.30
1	C	208	DA	N1-C2-N3	-5.21	126.69	129.30
1	D	239	DA	N1-C2-N3	-5.20	126.70	129.30
1	C	202	DT	C6-C5-C7	-5.17	119.80	122.90
1	C	211	DA	O4'-C1'-C2'	5.15	110.02	105.90
1	D	222	DT	C6-C5-C7	-5.14	119.81	122.90
1	C	209	DT	C4-C5-C6	5.13	121.08	118.00
1	D	229	DT	C4-C5-C6	5.09	121.05	118.00
1	D	227	DT	C4-C5-C6	5.09	121.05	118.00
1	C	202	DT	C4-C5-C6	5.05	121.03	118.00
1	D	222	DT	C4-C5-C6	5.03	121.02	118.00
1	C	208	DA	O4'-C1'-C2'	5.01	109.91	105.90

There are no chirality outliers.

There are no planarity outliers.

6.2 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 each 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 averaged over the ensemble.

Mol	Chain	Non-H	H(model)	H(added)	Clashes
1	C	407	227	227	8
1	D	407	227	227	8
2	A	612	640	640	29
2	B	612	640	637	32
All	All	2038	1734	1731	66

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 18.

All clashes are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Clash(Å)	Distance(Å)
1:C:214:DA:H5"	2:B:105:ILE:HG21	0.63	1.71
1:D:234:DA:H5"	2:A:5:ILE:HG21	0.63	1.71
2:B:155:GLN:NE2	2:B:161:MET:SD	0.62	2.73
2:A:55:GLN:NE2	2:A:61:MET:SD	0.61	2.73
2:B:114:ARG:HH11	2:B:114:ARG:HG2	0.60	1.56
2:B:127:LEU:O	2:B:130:LYS:N	0.60	2.35
2:A:14:ARG:HH11	2:A:14:ARG:HG2	0.59	1.57
2:B:123:ARG:O	2:B:127:LEU:N	0.57	2.35
2:A:27:LEU:O	2:A:30:LYS:N	0.56	2.39
2:A:23:ARG:O	2:A:27:LEU:N	0.56	2.36
2:A:24:LYS:O	2:A:28:MET:SD	0.56	2.64
2:B:124:LYS:O	2:B:128:MET:SD	0.55	2.65
1:C:208:DA:O4'	2:A:2:ARG:CZ	0.54	2.56
1:D:228:DA:O4'	2:B:102:ARG:CZ	0.54	2.56
1:C:214:DA:C5'	2:B:105:ILE:HG21	0.52	2.35
1:D:234:DA:H2"	1:D:235:DG:O5'	0.51	2.05
1:D:234:DA:C5'	2:A:5:ILE:HG21	0.51	2.35
2:A:28:MET:CE	2:A:54:PHE:CD2	0.51	2.93
2:B:159:THR:O	2:B:160:ASP:O	0.51	2.28
2:A:59:THR:O	2:A:60:ASP:O	0.51	2.28
2:A:41:GLU:HB3	2:A:63:LYS:HZ1	0.51	1.64
2:B:163:LYS:CG	2:B:164:VAL:N	0.51	2.74
2:B:141:GLU:HB3	2:B:163:LYS:HZ1	0.51	1.65
1:C:214:DA:H2"	1:C:215:DG:O5'	0.50	2.06
2:A:63:LYS:CG	2:A:64:VAL:N	0.50	2.74
2:B:135:SER:O	2:B:139:ASP:N	0.50	2.45
2:A:35:SER:O	2:A:39:ASP:N	0.50	2.45
2:B:148:ASN:OD1	2:B:149:SER:N	0.49	2.46
2:A:43:ALA:O	2:B:143:ALA:O	0.49	2.29
2:A:61:MET:SD	2:B:168:TYR:CZ	0.49	3.06
2:B:128:MET:CE	2:B:154:PHE:CD2	0.49	2.96
2:A:68:TYR:CZ	2:B:161:MET:SD	0.49	3.06
2:A:28:MET:HE1	2:A:54:PHE:CD2	0.48	2.44
2:B:165:LEU:O	2:B:169:THR:OG1	0.48	2.22
1:D:232:DA:OP1	2:A:29:LYS:CE	0.48	2.61
2:B:114:ARG:NH1	2:B:114:ARG:CG	0.47	2.78
2:A:40:ALA:O	2:A:58:SER:OG	0.47	2.31
2:A:47:PHE:N	2:A:47:PHE:CD1	0.47	2.83
1:C:212:DA:OP1	2:B:129:LYS:CE	0.47	2.61
1:D:234:DA:H1'	1:D:235:DG:O4'	0.47	2.09
1:C:214:DA:H1'	1:C:215:DG:O4'	0.47	2.09
2:A:14:ARG:CG	2:A:14:ARG:NH1	0.46	2.78
2:A:41:GLU:OE1	2:A:41:GLU:N	0.46	2.49

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Atom-1	Atom-2	Clash(Å)	Distance(Å)
2:B:141:GLU:OE1	2:B:141:GLU:N	0.46	2.49
2:B:114:ARG:HG2	2:B:114:ARG:NH1	0.45	2.27
2:B:140:ALA:O	2:B:158:SER:OG	0.45	2.31
2:A:38:ALA:O	2:A:39:ASP:C	0.45	2.55
2:A:48:ASN:OD1	2:A:49:SER:N	0.45	2.50
2:A:29:LYS:NZ	2:A:33:GLU:OE2	0.45	2.50
2:B:129:LYS:NZ	2:B:133:GLU:OE2	0.44	2.50
2:A:24:LYS:CD	2:A:52:LYS:HE3	0.44	2.42
2:A:14:ARG:O	2:A:18:VAL:HG23	0.44	2.13
2:A:41:GLU:OE1	2:A:41:GLU:CA	0.44	2.66
1:C:214:DA:C2	1:C:215:DG:C4	0.43	3.06
1:D:234:DA:C2	1:D:235:DG:C4	0.43	3.06
2:B:141:GLU:CA	2:B:141:GLU:OE1	0.43	2.65
2:B:163:LYS:O	2:B:167:LYS:N	0.43	2.43
2:B:124:LYS:CD	2:B:152:LYS:HE3	0.42	2.44
2:B:138:ALA:O	2:B:139:ASP:C	0.42	2.55
2:B:114:ARG:O	2:B:118:VAL:HG23	0.42	2.14
2:B:147:PHE:CD1	2:B:147:PHE:N	0.42	2.88
2:B:145:ILE:HG22	2:B:147:PHE:CE1	0.41	2.50
1:D:221:DC:H6	1:D:221:DC:HO5'	0.41	1.56
1:C:201:DC:HO5'	1:C:201:DC:H6	0.41	1.58
2:A:45:ILE:HG22	2:A:47:PHE:CE1	0.41	2.50
2:B:103:LYS:NZ	2:B:103:LYS:HB2	0.40	2.31

6.3 Torsion angles

6.3.1 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 PDB entries followed by that with respect to all NMR entries. 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	
2	A	72/85 (85%)	67 (93%)	4 (6%)	1 (1%)	19	64
2	B	72/85 (85%)	64 (89%)	7 (10%)	1 (1%)	19	64
All	All	144/170 (85%)	131 (91%)	11 (8%)	2 (1%)	19	64

All 2 Ramachandran outliers are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type
2	B	160	ASP
2	A	60	ASP

6.3.2 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 PDB entries followed by that with respect to all NMR entries. 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	
2	A	67/78 (86%)	59 (88%)	8 (12%)	11	53
2	B	67/78 (86%)	59 (88%)	8 (12%)	11	53
All	All	134/156 (86%)	118 (88%)	16 (12%)	11	53

All 16 residues with a non-rotameric sidechain are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type
2	B	124	LYS
2	A	24	LYS
2	B	173	GLU
2	A	73	GLU
2	A	41	GLU
2	A	30	LYS
2	B	130	LYS
2	B	128	MET
2	A	28	MET
2	A	52	LYS
2	B	141	GLU
2	A	3	LYS
2	A	67	LYS
2	B	152	LYS
2	B	167	LYS
2	B	103	LYS

6.3.3 RNA

There are no RNA molecules in this entry.

6.4 Non-standard residues in protein, DNA, RNA chains

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

6.5 Carbohydrates

There are no carbohydrates in this entry.

6.6 Ligand geometry

There are no ligands in this entry.

6.7 Other polymers

There are no such molecules in this entry.

6.8 Polymer linkage issues

There are no chain breaks in this entry.

7 Chemical shift validation

No chemical shift data were provided