Integrative Structure Validation Report

October 09, 2025 - 04:38 PM PDT

The following software was used in the production of this report:

IHMValidation Version 3.0
Python-IHM Version 2.5
MolProbity Version 4.5.2

PDB ID	9A0Y | pdb_00009a0y
PDB-Dev ID	PDBDEV_00000070
Structure Title	USP7 TRAF domain in complex with DNA polymerase iota peptide 573-584
Structure Authors	Ashton NW; Valles GJ; Jaiswal N; Bezsonova I; Woodgate R
Deposited on	2020-12-11

This is a PDB-IHM Structure Validation Report.

We welcome your comments at helpdesk@pdb-ihm.org

A user guide is available at https://pdb-ihm.org/validation_help.html with specific help available everywhere you see the ? symbol.

List of references used to build this report is available here.

1. Overview

1.1. Summary

This entry consists of 20 model(s). A total of 5 dataset(s) were used to build this entry.

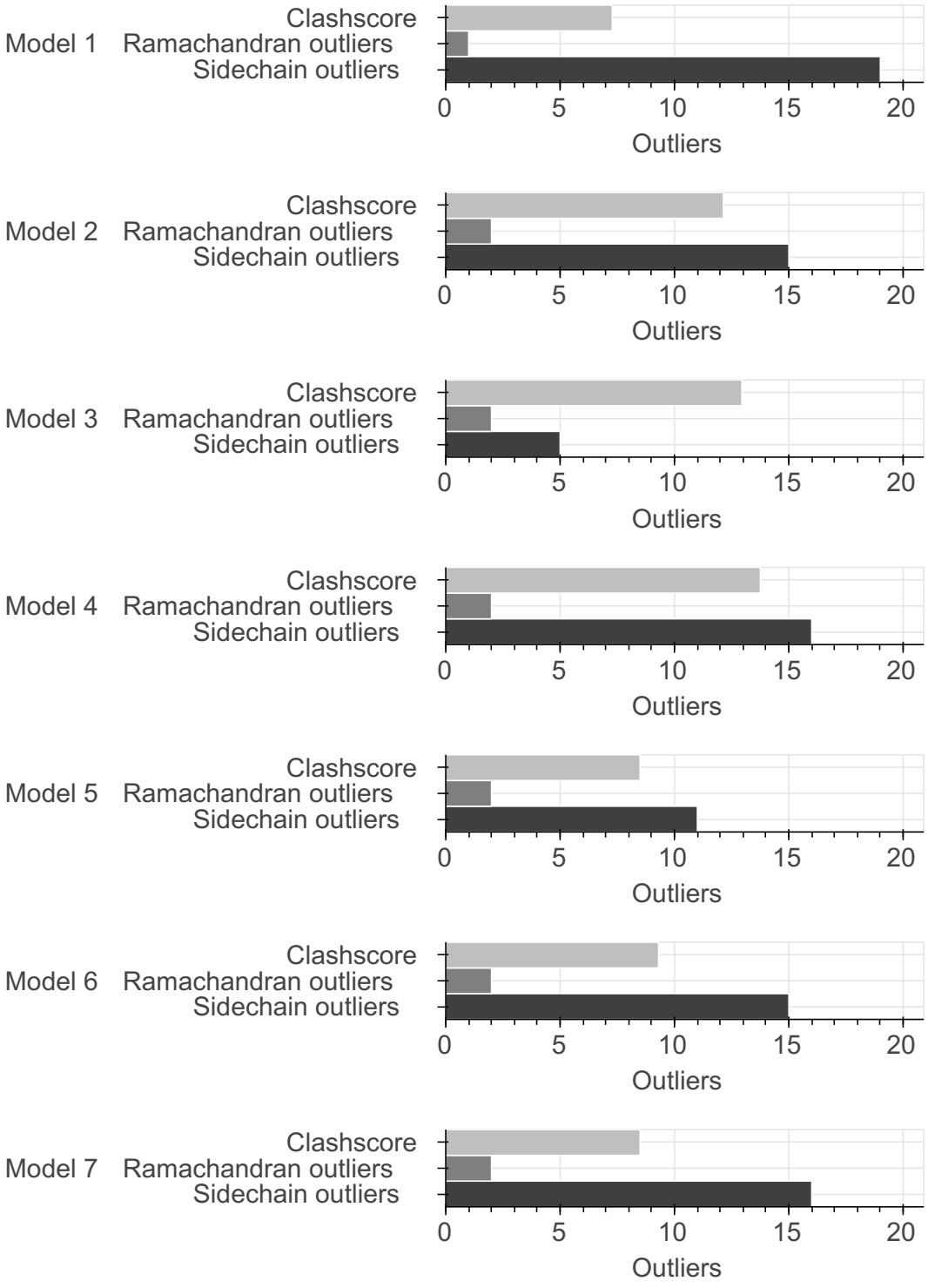
Name	Type	Count
Mutagenesis data	Experimental data	1
NMR data	Experimental data	1
Comparative model	Starting model	2

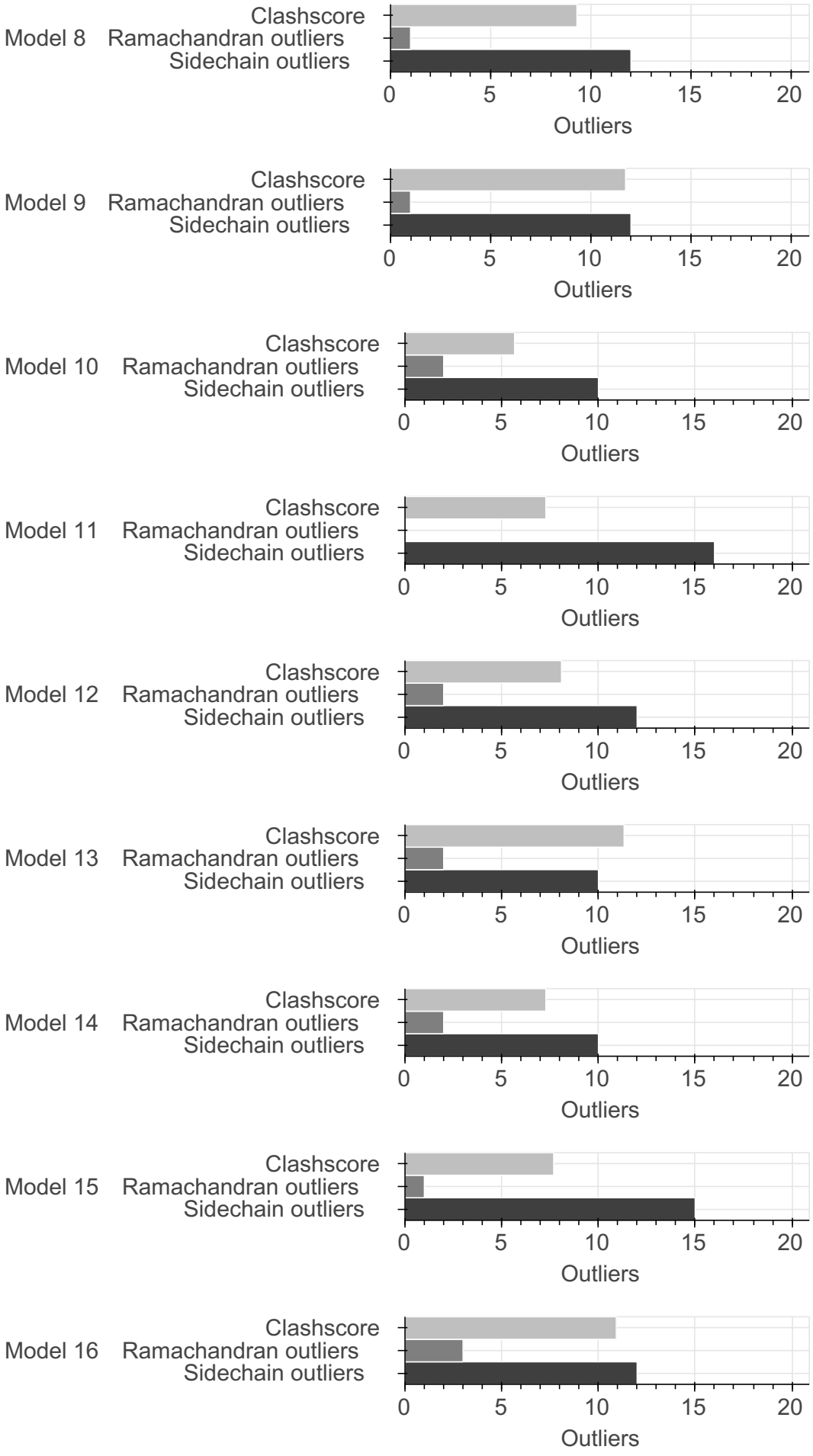
Name	Type	Count
Experimental model	Starting model	1

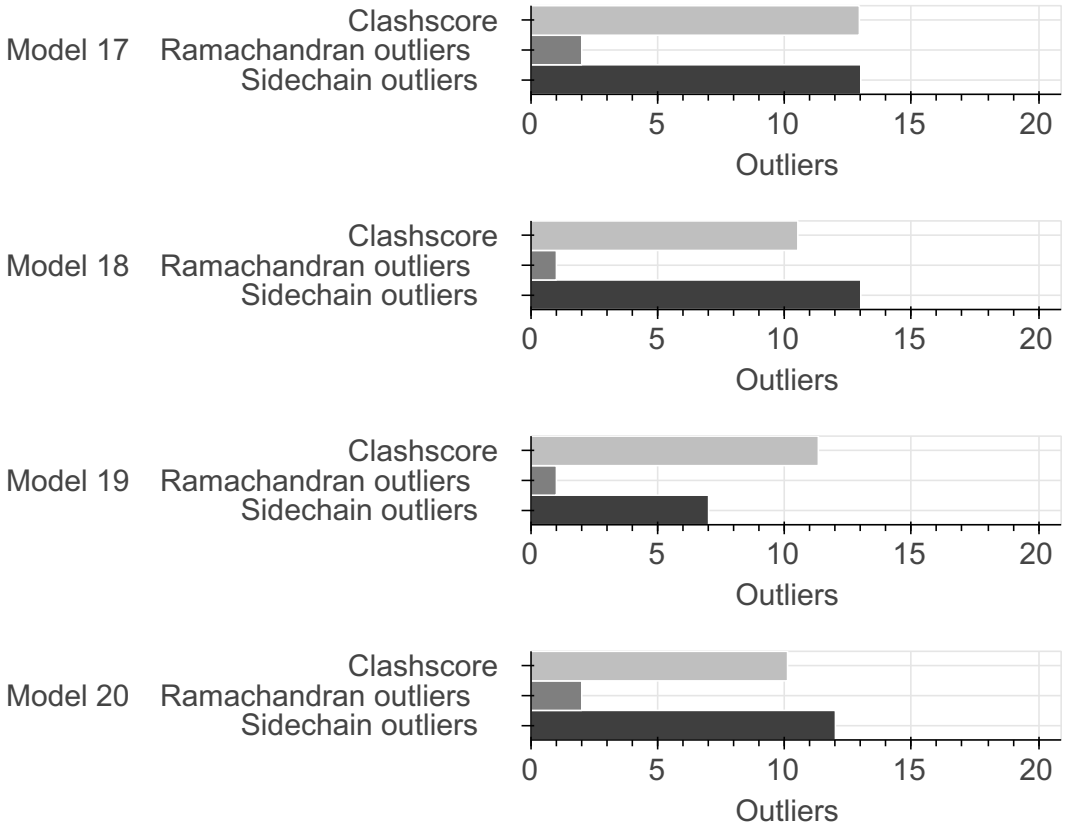
1.2. Overall quality

This validation report contains model quality assessments for all structures, data quality and fit to model assessments for SAS and crosslinking-MS datasets. Data quality and fit to model assessments for other datasets and model uncertainty are under development. Number of plots is limited to 256.

Model Quality: MolProbity Analysis




Model 8
Model 9
Model 10
Model 11
Model 12
Model 13
Model 14
Model 15
Model 16
Clashscore
Ramachandran outliers
Sidechain outliers
0
5
10
15
20
Outliers



2. Model Details

2.1. Ensemble information

This entry consists of 0 distinct ensemble(s).

2.2. Representation

This entry has 1 representation(s).

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
1	1-20	1	DNA polymerase iota peptide 573-584	A	12	1-12	-	100.00 / 100.00	Atomic
		2	USP7 TRAF domain	B	145	1-145	-	100.00 / 100.00	Atomic

2.3. Datasets used for modeling

There are 5 unique datasets used to build the models in this entry.

ID	Dataset type	Database name	Data access code
1	Comparative model	Not available	Not available
2	Comparative model	Not available	Not available

ID	Dataset type	Database name	Data access code
3	Experimental model	PDB	pdb_00002fop
4	NMR data	BMRB	50080
5	Mutagenesis data	Not available	10.1016/j.jmb.2020.166733

2.4. Methodology and software

This entry is a result of 1 distinct protocol(s).

Step number	Protocol ID	Method name	Method type	Method description	Number of computed models	Multi state modeling	Multi scale modeling
1	1	Not available	docking	Not available	Not available	False	False

There are 3 software packages reported in this entry.

ID	Software name	Software version	Software classification	Software location
1	MODELLER	Not available	model building	https://salilab.org/modeller/
2	HADDOCK	Not available	model building	http://haddock.science.uu.nl/services/HADDOCK/
3	PYMOL	Not available	model building	https://pymol.org/2/

3. Data quality

3.4. NMR

Validation for this section is under development.

3.4. Mutagenesis

Validation for this section is under development.

4. Model quality

For models with atomic structures, MolProbity analysis is performed. For models with coarse-grained or multi-scale structures, excluded volume analysis is performed.

4.1b. MolProbity Analysis

Excluded volume satisfaction for the models in the entry are listed below. The Analysed column shows the number of particle-partice or particle-atom pairs for which excluded volume was analysed.

Standard geometry: bond outliers

There are no bond length outliers.

Standard geometry: angle outliers

There are no bond angle outliers.

Too-close contacts

The following all-atom clashscore is based on a MolProbity analysis. All-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The table below contains clashscores for all atomic models in this entry.

Model ID	Clash score	Number of clashes
1	7.28	18
2	12.14	30
3	12.94	32
4	13.75	34
5	8.50	21
6	9.30	23
7	8.50	21
8	9.30	23
9	11.73	29
10	5.66	14
11	7.28	18
12	8.09	20
13	11.33	28
14	7.28	18
15	7.69	19
16	10.92	27
17	12.94	32
18	10.52	26
19	11.33	28
20	10.11	25

There are 486 clashes. The table below contains the detailed list of all clashes based on a MolProbity analysis. Bad clashes are >= 0.4 Angstrom. The output is limited to 100 rows.

Atom 1	Atom 2	Clash(Å)	Model ID (Worst)	Models (Total)
B:39:ILE:HD11	B:133:VAL:HG21	0.82	18	5
B:29:PRO:HG3	B:38:LYS:HE3	0.80	19	1
B:35:LEU:HD21	B:143:VAL:HG11	0.80	1	5
B:72:CYS:HB3	B:140:PRO:HB3	0.77	13	8
B:111:MET:SD	B:116:VAL:HB	0.76	8	11
B:16:GLU:HG2	B:128:LYS:HE2	0.76	18	2
B:43:PRO:HB3	B:52:GLN:HG2	0.76	9	4
B:79:LYS:HB2	B:91:SER:HB3	0.75	8	7
B:84:ARG:HG3	B:122:GLY:HA3	0.74	11	13
B:100:HIS:HD2	B:101:LYS:HG2	0.72	17	6

Atom 1	Atom 2	Clash(Å)	Model ID (Worst)	Models (Total)
B:10:THR:HB	B:134:PHE:HD1	0.72	9	10
B:7:SER:HA	B:33:ARG:HD3	0.71	18	6
B:43:PRO:HB2	B:52:GLN:HG2	0.70	16	3
B:124:ILE:HD11	B:127:ASP:HA	0.70	16	13
B:46:TYR:HB2	B:53:LYS:HB2	0.70	10	7
B:36:PRO:HD2	B:62:ASN:HB2	0.70	9	3
B:68:THR:HG22	B:100:HIS:HB2	0.69	12	2
B:27:SER:HB3	B:39:ILE:HB	0.69	2	4
B:78:LEU:HA	B:133:VAL:HG12	0.67	4	6
B:58:PHE:HA	B:106:GLY:HA3	0.67	20	5
B:16:GLU:HA	B:128:LYS:HG2	0.67	3	8
B:12:GLN:HG2	B:81:ILE:HD11	0.67	17	5
B:85:ASP:HB3	B:88:LYS:HG3	0.66	18	5
B:81:ILE:HD11	B:132:GLU:HB2	0.66	10	18
B:115:GLU:HG3	B:121:LYS:HE2	0.65	13	2
B:32:VAL:HB	B:37:TRP:CD1	0.65	12	13
B:85:ASP:HB3	B:88:LYS:HD3	0.64	15	1
B:27:SER:HB3	B:39:ILE:HG13	0.64	8	1
B:39:ILE:HD13	B:59:LEU:HG	0.64	13	1
B:58:PHE:HB3	B:104:ASP:OD1	0.63	13	3
B:73:HIS:HB2	B:97:LEU:HD12	0.63	7	2
B:20:ARG:HA	B:20:ARG:HE	0.62	2	2
A:7:THR:HG22	B:104:ASP:O	0.62	3	12
B:4:SER:HB3	B:31:PHE:HB3	0.62	17	1
B:20:ARG:HA	B:20:ARG:NE	0.62	2	15
B:14:THR:HG22	B:128:LYS:HG2	0.61	7	3
B:27:SER:CB	B:39:ILE:HB	0.61	2	5
B:29:PRO:HG3	B:38:LYS:HE2	0.60	4	1
B:70:TRP:HA	B:142:GLY:HA3	0.60	11	4
B:100:HIS:CD2	B:101:LYS:HG2	0.59	5	12
B:113:TRP:HA	B:116:VAL:HG12	0.59	3	3
B:99:PHE:HE2	B:101:LYS:HB2	0.59	15	4
B:16:GLU:HG2	B:128:LYS:HG2	0.58	10	2
B:17:ARG:HD2	B:20:ARG:HB2	0.58	9	1
B:17:ARG:HD3	B:127:ASP:OD2	0.57	3	5

Atom 1	Atom 2	Clash(Å)	Model ID (Worst)	Models (Total)
B:78:LEU:HB2	B:110:PHE:HE2	0.57	3	1
B:126:ASP:HB3	B:128:LYS:HE2	0.57	19	2
B:17:ARG:HA	B:127:ASP:OD2	0.57	12	11
B:99:PHE:CE2	B:101:LYS:HB2	0.56	15	7
B:118:ASP:HB3	B:121:LYS:HG2	0.56	5	5
B:142:GLY:HA2	B:145:TRP:CZ2	0.56	17	3
B:71:SER:HB3	B:97:LEU:HD21	0.56	19	1
A:3:CYS:SG	B:109:ASN:HB2	0.55	2	3
A:11:ASN:HB3	B:101:LYS:HD2	0.55	8	1
B:21:LEU:HD23	B:113:TRP:HH2	0.55	12	10
B:39:ILE:HG21	B:133:VAL:HG11	0.55	11	1
B:12:GLN:HG3	B:132:GLU:HG3	0.54	4	1
B:46:TYR:CG	B:47:PRO:HD2	0.54	17	3
B:49:ARG:HG3	B:50:PRO:HD2	0.53	16	5
B:115:GLU:HG2	B:121:LYS:HE2	0.53	18	2
B:43:PRO:CB	B:52:GLN:HG2	0.53	16	2
B:32:VAL:HG12	B:33:ARG:HG2	0.52	12	1
B:118:ASP:OD2	B:120:GLU:HB2	0.52	8	2
B:83:TYR:CE2	B:125:ASP:HB2	0.52	4	2
B:11:PHE:HE2	B:39:ILE:HG12	0.52	3	1
B:98:PHE:HE1	B:105:TRP:HB3	0.51	17	1
A:8:SER:HB2	B:42:MET:HE1	0.51	2	1
B:60:GLN:HB3	B:104:ASP:HB2	0.51	13	1
B:80:ILE:O	B:89:SER:HB3	0.51	8	6
B:26:LEU:HB3	B:38:LYS:HD3	0.51	3	1
A:6:GLY:HA2	B:105:TRP:CZ3	0.51	13	1
A:5:PRO:HB2	B:105:TRP:HE1	0.50	19	2
B:70:TRP:HH2	B:103:ASN:HD22	0.50	16	1
B:37:TRP:HZ3	B:59:LEU:HD21	0.50	17	1
B:46:TYR:CD1	B:47:PRO:HD2	0.50	20	3
B:99:PHE:CZ	B:101:LYS:HB2	0.49	16	1
B:111:MET:HE3	B:115:GLU:HG2	0.49	9	1
B:32:VAL:HB	B:37:TRP:NE1	0.49	14	5
B:82:ASN:HB3	B:85:ASP:O	0.48	4	8
B:29:PRO:HB3	B:38:LYS:HE3	0.48	5	2

Atom 1	Atom 2	Clash(Å)	Model ID (Worst)	Models (Total)
B:74:ALA:HB3	B:98:PHE:HE2	0.48	17	1
B:71:SER:HB3	B:97:LEU:HD11	0.48	20	1
B:140:PRO:HB2	B:143:VAL:HG21	0.48	4	2
B:26:LEU:HA	B:39:ILE:O	0.48	19	2
B:99:PHE:HE1	B:101:LYS:HB2	0.48	3	2
B:44:ARG:HG3	B:108:SER:O	0.48	3	1
B:53:LYS:HG3	B:54:SER:OG	0.47	2	1
B:7:SER:HA	B:33:ARG:CD	0.47	5	3
B:55:VAL:HG22	B:113:TRP:CE3	0.47	5	2
B:62:ASN:ND2	B:65:SER:HB3	0.47	4	3
B:79:LYS:HE3	B:81:ILE:HG12	0.47	4	1
B:84:ARG:HD3	B:122:GLY:CA	0.47	5	1
B:84:ARG:NH2	B:88:LYS:HE2	0.47	17	1
B:17:ARG:HG3	B:20:ARG:HB2	0.47	5	1
B:126:ASP:O	B:128:LYS:HE2	0.46	14	1
B:76:ALA:HB2	B:135:VAL:HG23	0.46	13	6
B:6:ARG:O	B:33:ARG:HD2	0.46	5	1
B:118:ASP:HB3	B:121:LYS:CG	0.46	12	3
B:140:PRO:HB2	B:143:VAL:CG2	0.46	11	2
B:78:LEU:O	B:91:SER:HA	0.46	1	7

Torsion angles: Protein backbone

In the following table, Ramachandran outliers are listed. The Analysed column shows the number of residues for which the backbone conformation was analysed.

Model ID	Analysed	Favored	Allowed	Outliers
1	153	140	12	1
2	153	140	11	2
3	153	139	12	2
4	153	142	9	2
5	153	143	8	2
6	153	143	8	2
7	153	142	9	2
8	153	142	10	1
9	153	144	8	1
10	153	139	12	2

Model ID	Analysed	Favored	Allowed	Outliers
11	153	143	10	0
12	153	143	8	2
13	153	138	13	2
14	153	143	8	2
15	153	145	7	1
16	153	141	9	3
17	153	145	6	2
18	153	144	8	1
19	153	141	11	1
20	153	142	9	2

There are 5 unique backbone outliers. Detailed list of outliers are tabulated below.

Chain	Res	Type	Models (Total)
B	47	PRO	19
B	48	ASP	8
B	53	LYS	4
B	62	ASN	1
B	101	LYS	1

Torsion angles : Protein sidechains ?

In the following table, sidechain rotameric outliers are listed. The Analysed column shows the number of residues for which the sidechain conformation was analysed.

Model ID	Analysed	Favored	Allowed	Outliers
1	142	108	15	19
2	142	111	16	15
3	142	112	25	5
4	142	108	18	16
5	142	107	24	11
6	142	111	16	15
7	142	106	20	16
8	142	111	19	12
9	142	111	19	12
10	142	113	19	10
11	142	108	18	16
12	142	110	20	12
13	142	110	22	10

Model ID	Analysed	Favored	Allowed	Outliers
14	142	113	19	10
15	142	110	17	15
16	142	113	17	12
17	142	108	21	13
18	142	113	16	13
19	142	112	23	7
20	142	112	18	12

There are 60 unique sidechain outliers. Detailed list of outliers are tabulated below.

Chain	Res	Type	Models (Total)
B	114	SER	16
B	108	SER	14
B	68	THR	13
B	91	SER	13
B	69	SER	11
B	111	MET	10
B	130	THR	10
B	49	ARG	9
B	51	HIS	9
B	4	SER	8
B	14	THR	8
B	24	SER	8
A	1	SER	7
A	12	SER	7
B	17	ARG	7
B	71	SER	7
A	7	THR	5
B	7	SER	5
B	66	ASP	5
B	20	ARG	4
B	23	GLU	4
B	54	SER	4
B	65	SER	4
B	72	CYS	4
B	104	ASP	4

Chain	Res	Type	Models (Total)
B	127	ASP	4
B	27	SER	3
B	67	SER	3
B	102	GLU	3
A	11	ASN	2
B	22	SER	2
B	39	ILE	2
B	40	MET	2
B	42	MET	2
B	60	GLN	2
B	78	LEU	2
B	80	ILE	2
B	133	VAL	2
B	138	ASP	2
B	141	HIS	2
A	8	SER	1
B	8	GLU	1
B	25	VAL	1
B	32	VAL	1
B	52	GLN	1
B	59	LEU	1
B	64	GLU	1
B	83	TYR	1
B	87	GLU	1
B	92	ARG	1
B	93	ARG	1
B	94	ILE	1
B	95	SER	1
B	107	PHE	1
B	109	ASN	1
B	115	GLU	1
B	117	THR	1
B	124	ILE	1
B	128	LYS	1
B	143	VAL	1

5. Fit to Data Used for Modeling Assessment

5.4. NMR

Validation for this section is under development.

5.4. Mutagenesis

Validation for this section is under development.

6. Fit to Data Used for Validation Assessment

Validation for this section is under development.

Acknowledgments

The development of integrative model validation metrics, implementation of a model validation pipeline, and creation of a validation report for integrative structures are funded by NSF awards to the PDB-IHM team (DBI-1756248, DBI-2112966, DBI-2112967, DBI-2112968, and DBI-1756250) and awards from NSF, NIH, and DOE to the RCSB PDB (DBI-2321666, R01GM157729, and DE-SC0019749). The PDB-IHM team and members of the Sali lab contributed model validation metrics and software packages.

Dr. Jill Trewhella, Dr. Dina Schneidman, and members of the SASBDB repository are acknowledged for their advice and support in implementing SAS validation methods. Team members from the labs of Dr. Juri Rappsilber, Dr. Alexander Leitner, Dr. Andrea Graziadei, and members of PRIDE database are acknowledged for their advice and support in implementing crosslinking-MS validation methods. We are grateful to Dr. Shruthi Viswanath for discussions about uncertainty assessment of integrative structural models.

Members of the wwPDB Integrative/Hybrid Methods Task Force provided recommendations and community support for the project.