

Integrative Structure Validation Report ?

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

IHMValidation Version 3.2

Python-IHM Version 2.9

MolProbity Version 4.5.2

PDB ID	9AAX pdb_00009aax
Structure Title	Multicomplex Integrative Structural Modeling of a Human Histone Deacetylase Interactome
Structure Authors	Nde, J.; Majila, K.; Kempf, C.; Zimmermann, R.C.; Zhang, Y.; Cesare, J.; Banks, C.A.S.; Thornton, J.L.; Florens, L.; Viswanath, S.; Washburn, M.
Deposited on	2026-08-05

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 ?

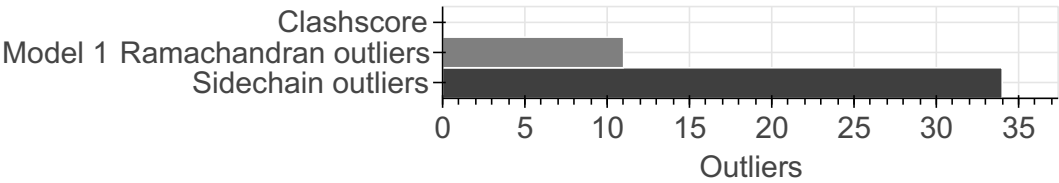
This entry consists of 1 model(s). A total of 7 dataset(s) were used to build this entry.

Name	Type	Count
Crosslinking-MS data	Experimental data	1
Mass Spectrometry data	Experimental data	1
De Novo model	Starting model	5

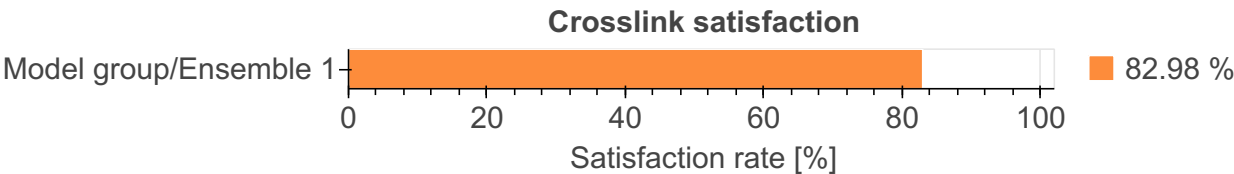
1.2. Overall quality ?

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 ?



Fit to Data Used for Modeling ?



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	1	Histone deacetylase 1	A	482	1-482	-	100.00 / 100.00	Atomic
		2	Methyl-CpG-binding protein 3	B	291	1-291	-	100.00 / 100.00	Atomic
		3	Metastasis-associated protein 1	C	715	1-715	-	100.00 / 100.00	Atomic
		4	GATA zinc finger domain-containing protein 2B	D	593	1-593	-	100.00 / 100.00	Atomic
		5	Retinoblastoma-binding protein 4	E	425	1-425	-	100.00 / 100.00	Atomic

2.3. Datasets used for modeling ?

There are 7 unique datasets used to build the models in this entry.

ID	Dataset type	Database name	Data access code
1	De Novo model	Zenodo	10.5281/zenodo.21811900
2	De Novo model	Zenodo	10.5281/zenodo.21811900
3	De Novo model	Zenodo	10.5281/zenodo.21811900
4	De Novo model	Zenodo	10.5281/zenodo.21811900
5	De Novo model	Zenodo	10.5281/zenodo.21811900
6	Crosslinking-MS data	ProteomeXchange	PXD082280
7	Mass Spectrometry data	MASSIVE	MSV000102752

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	Context dependent 3D structural prediction with AlphaFold3	Not available	Not available	False	False
2	1	Not available	XL-MS-guided assembly using HADDOCK	Not available	Not available	False	False

There are 2 software packages reported in this entry.

ID	Software name	Software version	Software classification	Software location
1	AlphaFold3	3.00	model prediction	https://alphafoldserver.com/
2	HADDOCK	2.50	model building	https://wenmr.science.uu.nl/haddock2.4/

3. Data quality ?

3.2. Crosslinking-MS

At the moment, data validation is only available for crosslinking-MS data deposited as a fully [compliant](#) dataset in the [PRIDE Crosslinking](#) database. Correspondence between crosslinking-MS and entry entities is established using [pyHMMER](#). Only residue pairs that passed the reported threshold are used for the analysis. The values in the report have to be interpreted in the context of the experiment (i.e. only a minor fraction of in-situ or in-vivo dataset can be used for modeling).

Crosslinking-MS dataset is not available in the [PRIDE Crosslinking](#) database.

3.4. Mass Spectrometry ?

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-particle or particle-atom pairs for which excluded volume was analysed.

Standard geometry: bond outliers ?

There are 4 bond length outliers in this entry (0.02% of 20225 assessed bonds). A summary is provided below.

Chain	Res	Type	Atoms	Z	Observed (Å)	Ideal (Å)	Model ID (Worst)	Models (Total)
B	191	PRO	N-CD	6.42	1.38	1.47	1	1
D	201	PRO	N-CD	4.37	1.41	1.47	1	1
C	456	ARG	CZ-NH2	4.12	1.28	1.33	1	1
B	190	MET	C-N	4.09	1.28	1.34	1	1

Standard geometry: angle outliers ?

There are 26 bond angle outliers in this entry (0.10% of 27366 assessed bonds). A summary is provided below.

Chain	Res	Type	Atoms	Z	Observed (Å)	Ideal (Å)	Model ID (Worst)	Models (Total)
A	269	ASP	CA-CB-CG	5.15	107.45	112.60	1	1
B	270	ASP	CA-CB-CG	5.00	117.60	112.60	1	1
B	269	ASP	CA-CB-CG	4.92	117.52	112.60	1	1
B	271	ASP	CA-CB-CG	4.84	117.44	112.60	1	1
C	701	PRO	CA-C-N	4.60	123.80	116.90	1	1
C	702	PRO	CA-C-N	4.52	123.67	116.90	1	1
E	397	ASN	CA-CB-CG	4.38	116.98	112.60	1	1
C	699	ARG	CA-C-N	4.36	123.43	116.90	1	1
C	474	HIS	CB-CG-CD2	4.32	125.58	131.20	1	1
C	704	ALA	CA-C-N	4.32	123.37	116.90	1	1
B	118	HIS	CB-CG-CD2	4.27	125.65	131.20	1	1
C	700	PRO	CA-C-N	4.22	123.23	116.90	1	1
A	260	GLN	OE1-CD-NE2	4.21	118.39	122.60	1	1
D	204	GLN	OE1-CD-NE2	4.16	118.44	122.60	1	1
A	281	HIS	CB-CG-CD2	4.13	125.83	131.20	1	1
D	67	GLN	OE1-CD-NE2	4.12	118.48	122.60	1	1
D	482	GLN	OE1-CD-NE2	4.11	118.49	122.60	1	1
B	260	ALA	CA-C-N	4.10	123.06	116.90	1	1
A	3	GLN	OE1-CD-NE2	4.10	118.50	122.60	1	1
D	276	GLN	OE1-CD-NE2	4.10	118.50	122.60	1	1
C	570	PRO	C-N-CA	4.09	129.06	121.70	1	1
C	611	GLN	OE1-CD-NE2	4.07	118.53	122.60	1	1

Chain	Res	Type	Atoms	Z	Observed (Å)	Ideal (Å)	Model ID (Worst)	Models (Total)
D	7	ASP	CA-CB-CG	4.06	108.54	112.60	1	1
C	102	GLN	OE1-CD-NE2	4.05	118.55	122.60	1	1
D	464	ALA	C-CA-CB	4.04	116.56	110.50	1	1
C	692	GLN	OE1-CD-NE2	4.04	118.56	122.60	1	1

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	0.00	0

There are no too-close contacts.

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	2496	2425	60	11

There are 11 unique backbone outliers. Detailed list of outliers are tabulated below.

Chain	Res	Type	Models (Total)
A	3	GLN	1
B	259	GLU	1
C	96	PRO	1
C	383	PRO	1
C	571	VAL	1
D	217	VAL	1
D	297	ASN	1
D	413	LEU	1
E	106	GLY	1
E	212	LYS	1
E	315	SER	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	2179	2098	47	34

There are 34 unique sidechain outliers. Detailed list of outliers are tabulated below.

Chain	Res	Type	Models (Total)
A	85	SER	1
A	88	SER	1
A	203	GLU	1
A	211	LEU	1
A	445	THR	1
B	27	SER	1
B	39	SER	1
B	219	MET	1
C	198	VAL	1
C	211	ASP	1
C	281	CYS	1
C	319	SER	1
C	516	LEU	1
C	526	LEU	1
C	543	THR	1
C	564	THR	1
D	26	ASP	1
D	32	LEU	1
D	72	VAL	1
D	106	ASP	1
D	112	SER	1
D	165	LEU	1
D	252	THR	1
D	289	THR	1
D	343	THR	1
D	360	LEU	1
D	364	LEU	1
D	428	THR	1
D	434	GLU	1
E	60	ASP	1
E	126	GLU	1
E	224	THR	1
E	289	LEU	1
E	353	GLU	1

5. Fit to Data Used for Modeling Assessment ?

5.2. Crosslinking-MS ?

5.2.1. Restraint types ?

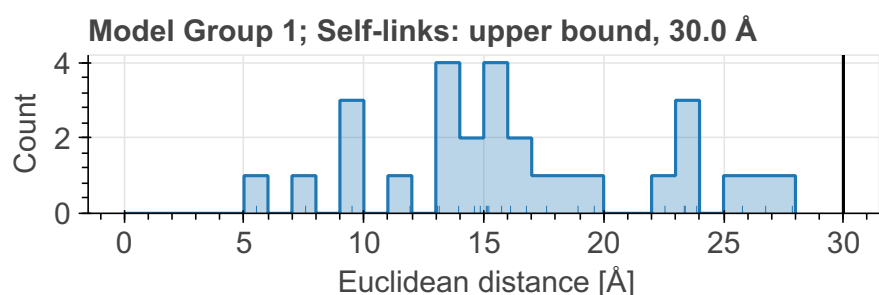
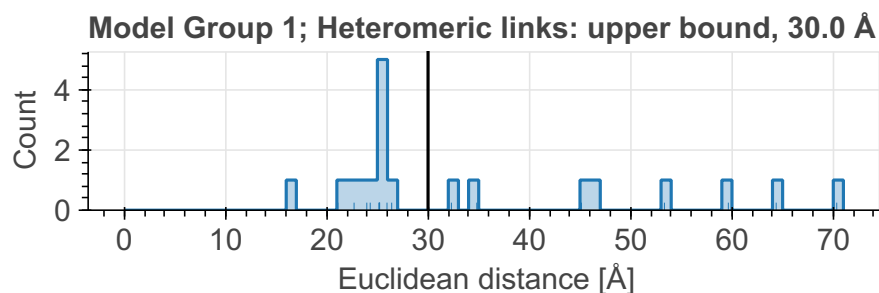
This table summarizes information about crosslinker(s) used for data generation, and how crosslinking information was translated into actual modeling restraints. Restraints assigned "by-residue" are interpreted as between CA atoms. Restraints between coarse-grained beads are indicated as "coarse-grained". *Restraint group* represents a set of crosslinking restraints applied collectively in the modeling.

There are 47 crosslinking restraints combined in 47 restraint groups.

Linker	Residue 1	Atom 1	Residue 2	Atom 2	Restraint type	Distance, Å	Count
DSSO	LYS	CA	LYS	CA	upper bound	30.00	47

Distograms of individual restraints

Distograms (i.e., histogram plots of distances) provide an overview of distributions of distances between residues for which chemical crosslinks were identified. The shift of the distogram relative to the threshold value may indicate a poor model. Restraints with identical thresholds are grouped into one plot. Only the best distance per restraint per model group/ensemble is plotted. Inter- and intramolecular (including self-links) restraints are also grouped into one plot. Distance for a restraint between coarse-grained beads is calculated as a minimal distance between shells; if beads intersect, the distance will be reported as 0.0. A bead with the highest available resolution for a given residue is used for the assessment.



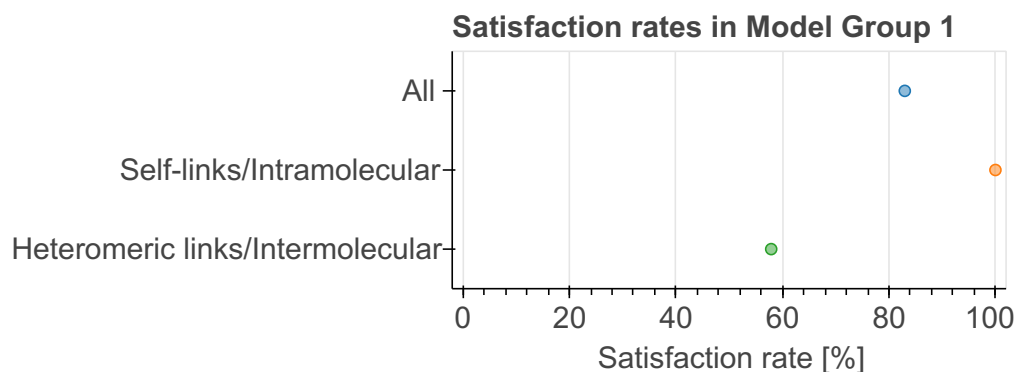
5.2.2. Satisfaction of restraints ?

Satisfaction of restraints is calculated on a *restraint group* (a set of crosslinking restraints applied collectively in the modeling) level. Satisfaction of a restraint group depends on satisfaction of individual restraints in the group and the conditionality (all/any). A restraint group is considered satisfied, if the condition was met in at least one model of the model group/ensemble. The number of measured restraints can be smaller than the total number of restraint groups if crosslinks involve non-modeled residues. Only deposited models are used for validation right now.

State group	State	Model group	# of Deposited models/Total	Restraint group type	Satisfied (%)	Violated (%)	Count (Total=47)
1	1	1	1/1	All	82.98	17.02	47
				Self-links/ Intramolecular	100.00	0.00	28
				Heteromeric links/ Intermolecular	57.89	42.11	19

Per-model satisfaction rates in ensembles

Every point represents one model in a model group/ensemble. Where possible, boxplots with quartile marks are also plotted.



5.4. Mass Spectrometry ?

Validation for this section is under development.

6. Fit to Data Used for Validation Assessment ?

Validation for this section is under development.

Acknowledgments

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