

Integrative Structure Validation Report ?

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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	9A9V pdb_00009a9v
Structure Title	All-atom model of the Rev Response RNA Element of HIV-1 generated by mutagenesis- and FRET-guided FARFAR2 model selection.
Structure Authors	Szewczyk, M.; Loharch, S.; Lopez-Nunez, S.; Gallego J.
Deposited on	2025-05-06

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 ?

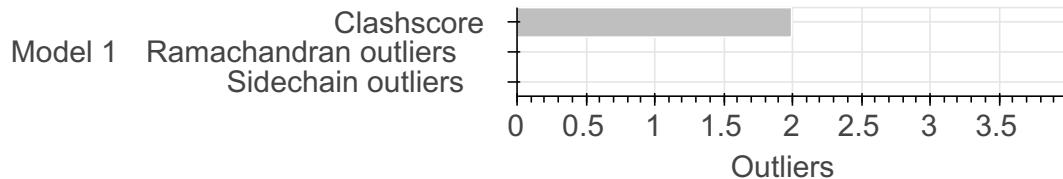
This entry consists of 1 model(s). A total of 2 dataset(s) were used to build this entry.

Name	Type	Count
Ensemble FRET data	Experimental data	1
Predicted contacts	Experimental data	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



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	RNA (234-MER)	A	234	-	1-234	100.00 / 0.00	Atomic

2.3. Datasets used for modeling

There are 2 unique datasets used to build the models in this entry.

ID	Dataset type	Database name	Data access code
1	Ensemble FRET data	Zenodo	10.5281/zenodo.17380954
2	Predicted contacts	Not available	Not available

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

Step number	Protocol ID	Method name	Method type	Method description	Number of computed models	Multi state modeling	Multi scale modeling
1	1	Not available	Not available	An ensemble of 89,187 all-atom models of the 234-nt ARV-2/SF2 RRE structure was generated using the Rosetta 3.13 FARFAR2 algorithm. The calculations employed 20,000 Monte Carlo cycles per model with default parameters and used RRE base-pairings derived from a previous SHAPE study (Bai et al. <i>Elife</i> 3, e03656, 2014) as the only restraint. The models were scored with the <code>rna_res_level_energy4</code> function and a set of 400 lowest-energy models was selected from the ensemble. The separation between subdomains IA and IIB, experimentally determined by FRET, was assessed by measuring the distance between A58 O2' and A219 C4', located close to the cy5 and cy3 fluorophores, respectively, in the cy3/cy5-labeled RRE construct. The model deposited in this entry was selected from a subset of 34 low-energy models exhibiting a subdomain IA-IIB separation distance consistent with the experimental FRET ratios (50-70 Å).	Not available	False	False

There is 1 software package reported in this entry.

ID	Software name	Software version	Software classification	Software location
1	Rosetta	3.13 FARFAR2	Model building	https://rosettacommons.org/software/

3. Data quality

3.4. Ensemble FRET

Validation for this section is under development.

3.4. Predicted contacts

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 1 bond length outliers in this entry (0.02% of 5598 assessed bonds). A summary is provided below.

Chain	Res	Type	Atoms	Z	Observed (Å)	Ideal (Å)	Model ID (Worst)	Models (Total)
A	67	G	O3'-P	4.99	1.53	1.61	1	1

Standard geometry: angle outliers [?](#)

There are 4 bond angle outliers in this entry (0.05% of 8728 assessed bonds). A summary is provided below.

Chain	Res	Type	Atoms	Z	Observed (Å)	Ideal (Å)	Model ID (Worst)	Models (Total)
A	67	G	O3'-P-O5'	6.04	113.06	104.00	1	1
A	172	C	C5'-C4'-C3'	5.16	123.75	116.00	1	1
A	172	C	O4'-C4'-C3'	4.77	99.23	104.00	1	1
A	172	C	C4'-C3'-C2'	4.48	98.12	102.60	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	1.99	15

There are 15 clashes. The table below contains the detailed list of all clashes based on a MolProbity analysis. Bad clashes are >= 0.4 Angstrom.

Atom 1	Atom 2	Clash(Å)	Model ID (Worst)	Models (Total)
A:132:U:C6	A:132:U:OP1	1.05	1	1
A:132:U:H6	A:132:U:OP1	0.66	1	1
A:61:G:H8	A:61:G:O5'	0.62	1	1
A:87:U:O2'	A:89:U:OP2	0.61	1	1
A:132:U:O4'	A:132:U:P	0.52	1	1
A:148:U:H6	A:148:U:O5'	0.52	1	1
A:75:A:O2'	A:99:U:OP2	0.50	1	1
A:146:C:H6	A:146:C:O5'	0.50	1	1
A:116:A:H8	A:116:A:O5'	0.47	1	1
A:132:U:O4'	A:132:U:OP1	0.46	1	1
A:26:G:H2'	A:27:G:O4'	0.44	1	1
A:39:G:O4'	A:39:G:OP2	0.42	1	1
A:156:A:H2'	A:157:A:C8	0.42	1	1

Atom 1	Atom 2	Clash(Å)	Model ID (Worst)	Models (Total)
A:160:C:H6	A:160:C:O5'	0.41	1	1
A:27:G:N2	A:205:G:O6	0.41	1	1

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	0	0	0	0

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	0	0	0	0

5. Fit to Data Used for Modeling Assessment ?

5.4. Ensemble FRET ?

Validation for this section is under development.

5.4. Predicted contacts ?

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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