

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	8ZZ7 pdb_00008zz7
PDB-Dev ID	PDBDEV_00000007
Structure Title	Serum Albumin Domain C Structure
Structure Authors	Belsom, A.; Schneider, M.; Fischer, L.; Brock, O.; Rappsilber, J.
Deposited on	2017-11-01

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

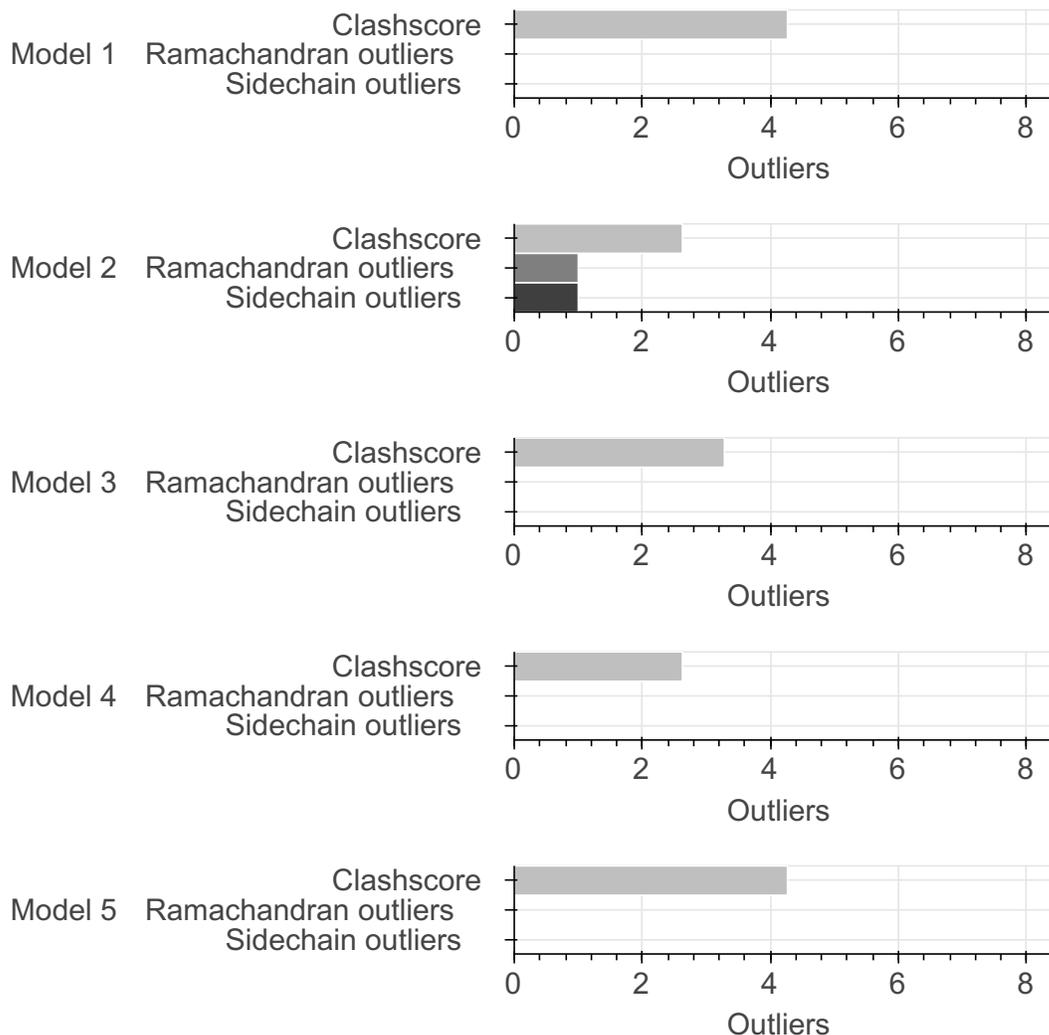
This entry consists of 5 model(s). A total of 2 dataset(s) were used to build this entry.

Name	Type	Count
Crosslinking-MS data	Experimental data	1
Predicted contacts	Experimental data	1

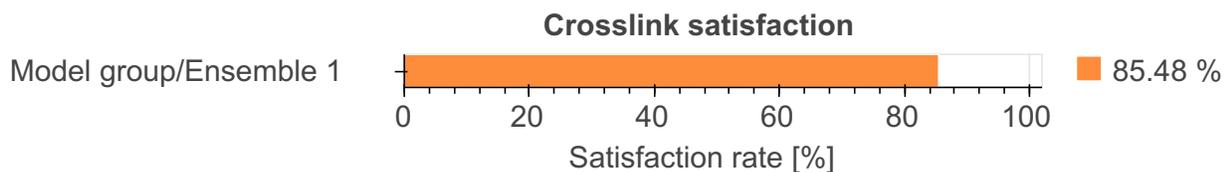
1.2. Overall quality

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 ?



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	1-5	1	HSA_C	A	192	1-192	-	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	Crosslinking-MS data	PRIDE	PXD001692
2	Predicted contacts	Zenodo	10.5281/zenodo.1035833

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	Conformational search	Model-based search (MBS) in Rosetta	Not available	5000	False	False

There are 2 software packages reported in this entry.

ID	Software name	Software version	Software classification	Software location
1	Rosetta MBS	Not available	Model Building	https://compbio.robotics.tu-berlin.de/rbo_aleph
2	EPC-map	Not available	Contact Predictor	https://compbio.robotics.tu-berlin.de/epsilon

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. 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 31 bond length outliers in this entry (0.40% of 7675 assessed bonds). A summary is provided below.

Chain	Res	Type	Atoms	Z	Observed (Å)	Ideal (Å)	Model ID (Worst)	Models (Total)
A	31	PRO	N-CD	7.22	1.57	1.47	2	5
A	78	PRO	N-CD	6.46	1.56	1.47	2	5
A	96	PRO	N-CD	5.70	1.55	1.47	2	4
A	57	PRO	N-CD	5.66	1.55	1.47	3	4
A	26	PRO	N-CD	5.49	1.55	1.47	4	4
A	109	PRO	N-CD	5.04	1.54	1.47	4	4
A	51	PRO	N-CD	4.49	1.54	1.47	1	3
A	147	PRO	N-CD	4.49	1.54	1.47	2	2

Standard geometry: angle outliers ?

There are 60 bond angle outliers in this entry (0.58% of 10340 assessed bonds). A summary is provided below.

Chain	Res	Type	Atoms	Z	Observed (Å)	Ideal (Å)	Model ID (Worst)	Models (Total)
A	87	CYS	N-CA-CB	4.59	102.69	110.50	1	5
A	71	CYS	N-CA-CB	4.59	102.69	110.50	1	5
A	86	CYS	N-CA-CB	4.58	102.71	110.50	4	5
A	168	CYS	N-CA-CB	4.58	102.72	110.50	3	5
A	124	CYS	N-CA-CB	4.58	102.72	110.50	5	5
A	2	CYS	N-CA-CB	4.58	102.72	110.50	4	5
A	58	CYS	N-CA-CB	4.57	102.73	110.50	3	5
A	47	CYS	N-CA-CB	4.57	102.74	110.50	4	5
A	169	CYS	N-CA-CB	4.57	102.74	110.50	1	5
A	177	CYS	N-CA-CB	4.56	102.74	110.50	5	5
A	97	CYS	N-CA-CB	4.56	102.75	110.50	2	5
A	48	CYS	N-CA-CB	4.55	102.76	110.50	3	5

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	4.27	13
2	2.63	8
3	3.28	10
4	2.63	8
5	4.27	13

There are 52 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:124:CYS:O	A:131:ARG:NH2	0.76	1	3
A:139:LEU:C	A:139:LEU:HD23	0.65	5	1
A:166:GLU:O	A:169:CYS:SG	0.62	4	1
A:139:LEU:O	A:139:LEU:HD23	0.62	5	1
A:45:SER:O	A:48:CYS:SG	0.58	1	1
A:63:LEU:C	A:63:LEU:HD23	0.58	3	1
A:45:SER:HA	A:48:CYS:SG	0.56	1	1
A:124:CYS:C	A:131:ARG:HH21	0.56	1	2
A:168:CYS:HA	A:177:CYS:SG	0.56	3	1
A:43:VAL:O	A:47:CYS:SG	0.53	4	1
A:77:THR:N	A:78:PRO:CD	0.53	4	4
A:2:CYS:SG	A:56:MET:O	0.52	5	1
A:110:LYS:HD3	A:110:LYS:N	0.52	2	1
A:121:ALA:O	A:124:CYS:SG	0.51	4	2
A:30:THR:HB	A:31:PRO:HD3	0.50	1	5
A:38:ARG:NH2	A:136:GLN:OE1	0.49	3	1
A:63:LEU:O	A:63:LEU:HD23	0.49	3	1
A:149:ALA:HB2	A:192:ALA:OXT	0.47	5	1
A:126:LEU:O	A:131:ARG:NH1	0.47	4	1
A:139:LEU:C	A:139:LEU:CD2	0.47	5	1
A:124:CYS:SG	A:174:LYS:HD2	0.46	1	1
A:30:THR:N	A:31:PRO:CD	0.46	2	5
A:68:ASN:O	A:71:CYS:HB2	0.45	1	2
A:164:PHE:C	A:164:PHE:CD1	0.45	2	1
A:45:SER:O	A:48:CYS:HB2	0.45	5	1
A:164:PHE:CE1	A:168:CYS:SG	0.44	2	1

Atom 1	Atom 2	Clash(Å)	Model ID (Worst)	Models (Total)
A:54:LYS:HA	A:55:ARG:HA	0.44	3	1
A:77:THR:HB	A:78:PRO:HD3	0.42	4	4
A:21:TYR:C	A:21:TYR:CD1	0.41	1	1
A:164:PHE:CD1	A:164:PHE:O	0.41	2	1
A:164:PHE:O	A:168:CYS:SG	0.41	1	1
A:63:LEU:C	A:63:LEU:CD2	0.41	3	1
A:93:ASN:C	A:93:ASN:OD1	0.41	3	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	190	185	5	0
2	190	185	4	1
3	190	189	1	0
4	190	185	5	0
5	190	183	7	0

There are 1 unique backbone outliers. Detailed list of outliers are tabulated below.

Chain	Res	Type	Models (Total)
A	93	ASN	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	171	169	2	0
2	171	169	1	1
3	171	171	0	0
4	171	171	0	0
5	171	171	0	0

There are 1 unique sidechain outliers. Detailed list of outliers are tabulated below.

Chain	Res	Type	Models (Total)
A	110	LYS	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.

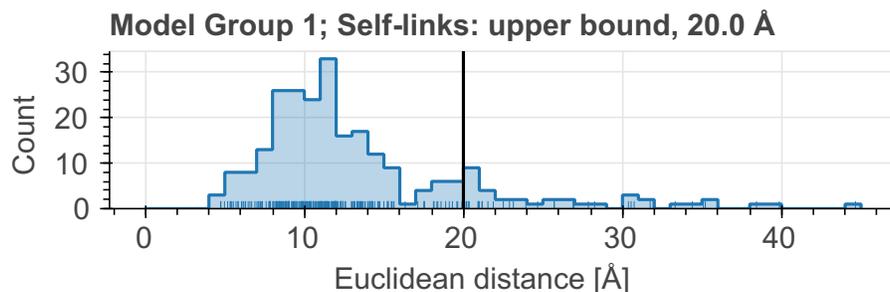
There are 248 crosslinking restraints combined in 248 restraint groups.

Linker	Residue 1	Atom 1	Residue 2	Atom 2	Restraint type	Distance, Å	Count
sulfo-SDA	LYS	CA	SER	CA	upper bound	20.00	6
sulfo-SDA	HIS	CA	LYS	CA	upper bound	20.00	2
sulfo-SDA	LYS	CA	PRO	CA	upper bound	20.00	10
sulfo-SDA	GLU	CA	LYS	CA	upper bound	20.00	23
sulfo-SDA	THR	CA	VAL	CA	upper bound	20.00	8
sulfo-SDA	GLU	CA	THR	CA	upper bound	20.00	11
sulfo-SDA	CYS	CA	LYS	CA	upper bound	20.00	2
sulfo-SDA	LYS	CA	VAL	CA	upper bound	20.00	21
sulfo-SDA	PRO	CA	SER	CA	upper bound	20.00	3
sulfo-SDA	LEU	CA	THR	CA	upper bound	20.00	5
sulfo-SDA	ALA	CA	LYS	CA	upper bound	20.00	10
sulfo-SDA	LYS	CA	THR	CA	upper bound	20.00	10
sulfo-SDA	LYS	CA	PHE	CA	upper bound	20.00	10
sulfo-SDA	GLY	CA	LYS	CA	upper bound	20.00	3
sulfo-SDA	LYS	CA	LYS	CA	upper bound	20.00	2
sulfo-SDA	LEU	CA	TYR	CA	upper bound	20.00	2
sulfo-SDA	LYS	CA	TYR	CA	upper bound	20.00	10
sulfo-SDA	PHE	CA	THR	CA	upper bound	20.00	2
sulfo-SDA	ASP	CA	LYS	CA	upper bound	20.00	14
sulfo-SDA	ASP	CA	THR	CA	upper bound	20.00	4
sulfo-SDA	THR	CA	THR	CA	upper bound	20.00	4
sulfo-SDA	PRO	CA	THR	CA	upper bound	20.00	9
sulfo-SDA	THR	CA	TYR	CA	upper bound	20.00	3
sulfo-SDA	TYR	CA	VAL	CA	upper bound	20.00	4
sulfo-SDA	SER	CA	VAL	CA	upper bound	20.00	5
sulfo-SDA	HIS	CA	SER	CA	upper bound	20.00	1
sulfo-SDA	GLY	CA	SER	CA	upper bound	20.00	1

Linker	Residue 1	Atom 1	Residue 2	Atom 2	Restraint type	Distance, Å	Count
sulfo-SDA	ASP	CA	TYR	CA	upper bound	20.00	3
sulfo-SDA	ARG	CA	TYR	CA	upper bound	20.00	1
sulfo-SDA	HIS	CA	TYR	CA	upper bound	20.00	1
sulfo-SDA	HIS	CA	THR	CA	upper bound	20.00	2
sulfo-SDA	SER	CA	THR	CA	upper bound	20.00	5
sulfo-SDA	ILE	CA	LYS	CA	upper bound	20.00	1
sulfo-SDA	GLU	CA	TYR	CA	upper bound	20.00	2
sulfo-SDA	ILE	CA	THR	CA	upper bound	20.00	3
sulfo-SDA	LEU	CA	LYS	CA	upper bound	20.00	9
sulfo-SDA	ARG	CA	LYS	CA	upper bound	20.00	2
sulfo-SDA	GLN	CA	LYS	CA	upper bound	20.00	2
sulfo-SDA	ASP	CA	SER	CA	upper bound	20.00	3
sulfo-SDA	PRO	CA	TYR	CA	upper bound	20.00	3
sulfo-SDA	LYS	CA	MET	CA	upper bound	20.00	2
sulfo-SDA	CYS	CA	SER	CA	upper bound	20.00	3
sulfo-SDA	PHE	CA	SER	CA	upper bound	20.00	1
sulfo-SDA	GLU	CA	SER	CA	upper bound	20.00	4
sulfo-SDA	GLN	CA	THR	CA	upper bound	20.00	1
sulfo-SDA	GLN	CA	TYR	CA	upper bound	20.00	2
sulfo-SDA	SER	CA	TYR	CA	upper bound	20.00	2
sulfo-SDA	ALA	CA	TYR	CA	upper bound	20.00	2
sulfo-SDA	LEU	CA	SER	CA	upper bound	20.00	2
sulfo-SDA	ASN	CA	TYR	CA	upper bound	20.00	1
sulfo-SDA	ALA	CA	THR	CA	upper bound	20.00	2
sulfo-SDA	GLY	CA	TYR	CA	upper bound	20.00	2
sulfo-SDA	PHE	CA	TYR	CA	upper bound	20.00	1
sulfo-SDA	MET	CA	SER	CA	upper bound	20.00	1

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=248)
1	1	1	5/5	All	85.48	14.52	248
				Self-links/ Intramolecular	85.48	14.52	248

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. 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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