

Integrative Structure Validation Report

July 22, 2024 - 04:24 PM PDT

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

Python-IHM Version 1.3

MolProbity Version 4.5.2

Integrative Modeling Validation Version 1.2

PDB ID	9A1B
PDB-Dev ID	PDBDEV_00000083
Structure Title	CS-Rosetta structure of engineered IgG-binding domain of protein G (GB) - model A1
Structure Authors	He Y; Chen Y; Ruan B; Choi EJ; Chen Y; Motabar D; Solomon T; Simmerman R; Kauffman T; Gallagher DT; Bryan PN; Orban J

This is a PDB-Dev IM Structure Validation Report for a publicly released PDB-Dev entry.

We welcome your comments at pdb-dev@mail.wwpdb.org

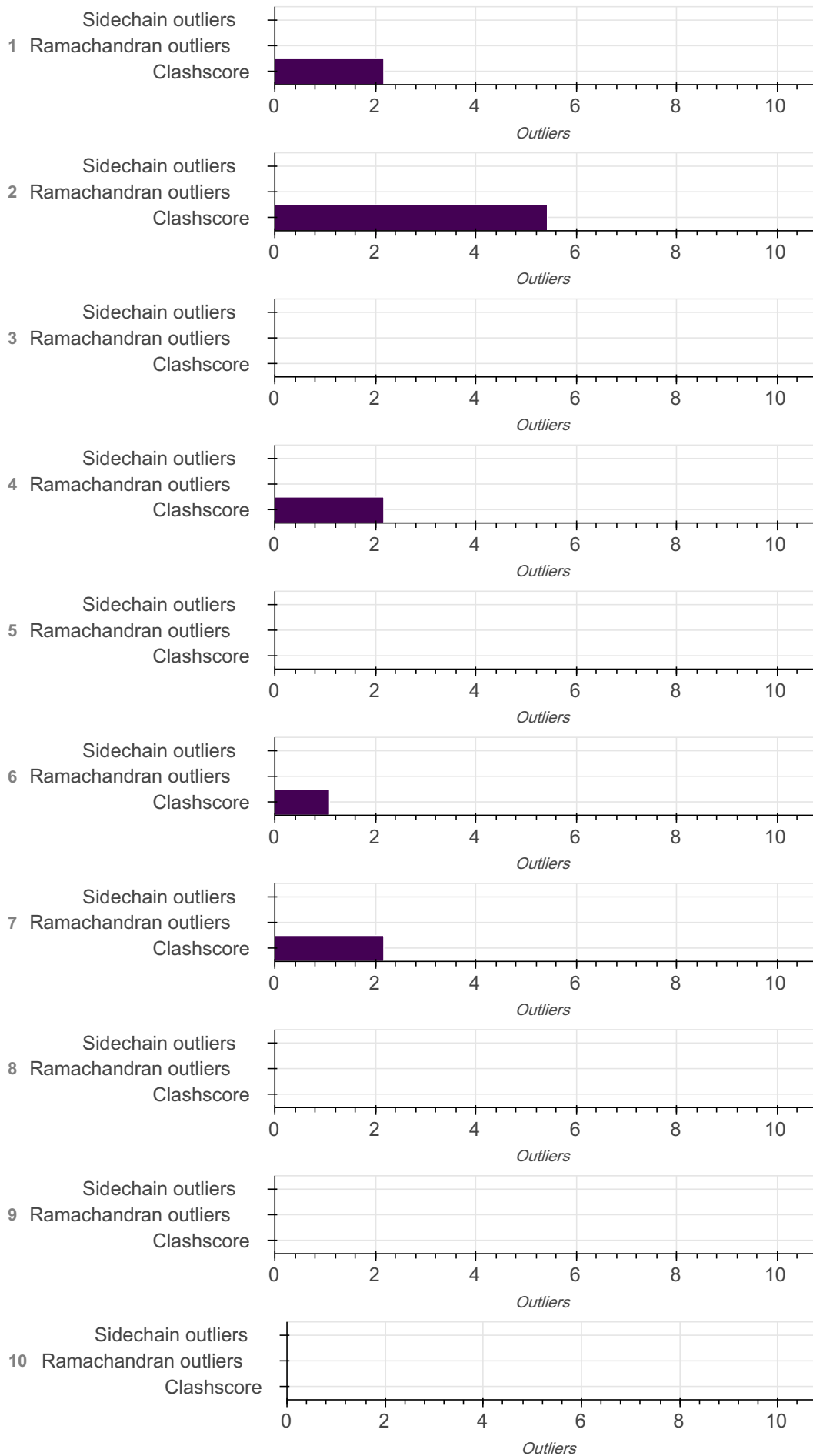
A user guide is available at https://pdb-dev.wwpdb.org/validation_help.html with specific help available everywhere you see the  symbol.

List of references used to build this report is available [here](#).

Overall quality

This validation report contains model quality assessments for all structures, data quality assessment for SAS datasets and fit to model assessments for SAS 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



Ensemble information ?

This entry consists of 0 distinct ensemble(s).

Summary ?

This entry consists of 10 unique models, with 1 subunits in each model. A total of 1 datasets or restraints were used to build this entry. Each model is represented by 0 rigid bodies and 1 flexible or non-rigid units.

Entry composition ?

There are 10 unique types of models in this entry. These models are titled None, None, None, None, None, None, None, None, None, None respectively.

Model ID	Subunit number	Subunit ID	Subunit name	Chain ID	Chain ID [auth]	Total residues
1	1	1	Immunoglobulin G-binding protein G	A	A	56
2	1	1	Immunoglobulin G-binding protein G	A	A	56
3	1	1	Immunoglobulin G-binding protein G	A	A	56
4	1	1	Immunoglobulin G-binding protein G	A	A	56
5	1	1	Immunoglobulin G-binding protein G	A	A	56
6	1	1	Immunoglobulin G-binding protein G	A	A	56
7	1	1	Immunoglobulin G-binding protein G	A	A	56
8	1	1	Immunoglobulin G-binding protein G	A	A	56
9	1	1	Immunoglobulin G-binding protein G	A	A	56

Model ID	Subunit number	Subunit ID	Subunit name	Chain ID	Chain ID [auth]	Total residues
10	1	1	Immunoglobulin G-binding protein G	A	A	56

Datasets used for modeling ?

There is 1 unique dataset used to build the models in this entry.

ID	Dataset type	Database name	Data access code
1	NMR data	BMRB	50907

Representation ?

This entry has only one representation and includes 0 rigid bodies and 1 flexible units

Chain ID	Rigid bodies	Non-rigid segments
A	-	1-56

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	-	CS-Rosetta modeling	-	-	False	False

There is 1 software package reported in this entry.

ID	Software name	Software version	Software classification	Software location
1	CS-Rosetta	Not available	model building	https://spin.niddk.nih.gov/bax/software/CSROSETTA/

Data quality ?

NMR

Validation for this section is under development.

Model quality ?

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

Standard geometry: bond outliers ?

There are 4830 bond outliers in this entry. A summary is provided below, and a detailed list of outliers can be found [here](#).

Bond type	Observed distance (Å)	Ideal distance (Å)	Number of outliers
N--H3	1.00	0.89	10
N--H1	1.00	0.89	10
N--H2	1.00	0.89	10
CB--HB3	1.09	0.97	400
CG2--HG22	1.09	0.97	110
CE--HE2	1.09	0.97	90
CD1--HD13	1.09	0.97	140
CG--HG3	1.09	0.97	200
CB--HB2	1.09	0.97	400
CA--HA	1.09	0.97	510
CA--HA3	1.09	0.97	40
CG2--HG21	1.09	0.97	110
CG1--HG13	1.09	0.97	100
CG2--HG23	1.09	0.97	110
CB--HB	1.09	0.97	110

Bond type	Observed distance (Å)	Ideal distance (Å)	Number of outliers
NZ--HZ3	1.01	0.89	90
CG1--HG12	1.09	0.97	100
CD2--HD22	1.09	0.97	80
CG--HG2	1.09	0.97	200
CE--HE3	1.09	0.97	90
CB--HB1	1.09	0.97	60
CD1--HD11	1.09	0.97	140
NZ--HZ1	1.01	0.89	90
CA--HA2	1.09	0.97	40
CD--HD3	1.09	0.97	90
CD1--HD12	1.09	0.97	140
CD2--HD23	1.09	0.97	80
CD2--HD21	1.09	0.97	80
OH--HH	0.96	0.84	20
CG1--HG11	1.09	0.97	40
CG--HG	1.09	0.97	80
NZ--HZ2	1.01	0.89	90
CD--HD2	1.09	0.97	90
OG1--HG1	0.96	0.84	10
CA--HA	1.10	0.97	10
CG--HG2	1.10	0.97	10
CD--HD2	1.10	0.97	10
CB--HB2	1.10	0.97	10

Bond type	Observed distance (Å)	Ideal distance (Å)	Number of outliers
CD--HD3	1.10	0.97	10
CB--HB3	1.10	0.97	10
CG--HG3	1.10	0.97	10
NE2--HE22	1.00	0.86	60
ND2--HD22	1.00	0.86	30
ND2--HD21	1.00	0.86	30
NE2--HE21	1.00	0.86	60
N--H	1.01	0.86	540
CE2--HE2	1.09	0.93	20
CE1--HE1	1.09	0.93	20
CD1--HD1	1.09	0.93	20
CD2--HD2	1.09	0.93	20

Standard geometry: angle outliers

There are 180 angle outliers in this entry. A summary is provided below, and a detailed list of outliers can be found [here](#).

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
H1-N-H3	97.25	109.47	1
H1-N-H3	97.23	109.47	1
H2-N-H3	97.23	109.47	1
H1-N-H2	97.22	109.47	1
H2-N-H3	97.21	109.47	1
H2-N-H3	97.20	109.47	1
H2-N-H3	97.19	109.47	2
H1-N-H2	97.19	109.47	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
H1-N-H2	97.18	109.47	1
H2-N-H3	97.18	109.47	2
H1-N-H3	97.18	109.47	3
H1-N-H3	97.17	109.47	2
H2-N-H3	97.17	109.47	1
H1-N-H2	97.17	109.47	3
H1-N-H2	97.16	109.47	1
H1-N-H2	97.15	109.47	2
H1-N-H3	97.15	109.47	1
H1-N-H3	97.14	109.47	1
H1-N-H2	97.14	109.47	1
H2-N-H3	97.14	109.47	2
H1-N-H3	97.11	109.47	1
CB-CG-HG2	122.67	109.00	1
CB-CG-HG2	122.70	109.00	2
CB-CG-HG2	122.71	109.00	1
CB-CG-HG2	122.72	109.00	3
CB-CG-HG2	122.74	109.00	6
CB-CG-HG2	122.75	109.00	6
CB-CG-HG2	122.76	109.00	2
CB-CG-HG2	122.77	109.00	10
CB-CG-HG2	122.78	109.00	4
CB-CG-HG2	122.79	109.00	9

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
CB-CG-HG2	122.80	109.00	7
CB-CG-HG2	122.81	109.00	4
CB-CG-HG2	122.82	109.00	1
CB-CG-HG2	122.83	109.00	2
CB-CG-HG2	122.85	109.00	1
CB-CG-HG2	122.86	109.00	1
CB-CG-HG3	94.62	109.00	1
CB-CG-HG3	94.61	109.00	2
CB-CG-HG3	94.60	109.00	1
CB-CG-HG3	94.59	109.00	1
CB-CG-HG3	94.58	109.00	3
CB-CG-HG3	94.57	109.00	6
CB-CG-HG3	94.56	109.00	7
CB-CG-HG3	94.55	109.00	11
CB-CG-HG3	94.54	109.00	5
CB-CG-HG3	94.53	109.00	8
CB-CG-HG3	94.52	109.00	4
CB-CG-HG3	94.51	109.00	2
CB-CG-HG3	94.50	109.00	5
CB-CG-HG3	94.49	109.00	2
CB-CG-HG3	94.48	109.00	1
CB-CG-HG3	94.46	109.00	1
CA-CB-HB3	93.39	109.00	3

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
CA-CB-HB3	93.38	109.00	3
CA-CB-HB3	93.36	109.00	1
CA-CB-HB3	93.35	109.00	3
CA-CB-HB3	93.34	109.00	4
CA-CB-HB3	93.33	109.00	4
CA-CB-HB3	93.32	109.00	3
CA-CB-HB3	93.31	109.00	4
CA-CB-HB3	93.30	109.00	2
CA-CB-HB3	93.29	109.00	2
CA-CB-HB3	93.28	109.00	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 the models in this entry.

Model ID	Clash score	Number of clashes
1	2.17	2
2	5.43	5
3	0.00	0
4	2.17	2
5	0.00	0
6	1.09	1
7	2.17	2
8	0.00	0
9	0.00	0

Model ID	Clash score	Number of clashes
10	0.00	0

All 12 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Model ID	Atom-1	Atom-2	Clash overlap (Å)
1	A:50:LEU:C	A:50:LEU:HD23	0.556
1	A:50:LEU:O	A:50:LEU:HD23	0.505
2	A:9:LEU:O	A:9:LEU:HD23	0.708
2	A:9:LEU:C	A:9:LEU:HD23	0.618
2	A:50:LEU:C	A:50:LEU:HD23	0.523
2	A:50:LEU:O	A:50:LEU:HD23	0.468
2	A:9:LEU:C	A:9:LEU:CD2	0.465
4	A:50:LEU:O	A:50:LEU:HD23	0.604
4	A:50:LEU:C	A:50:LEU:HD23	0.586
6	A:50:LEU:C	A:50:LEU:HD23	0.576
7	A:50:LEU:O	A:50:LEU:HD23	0.579
7	A:50:LEU:C	A:50:LEU:HD23	0.529

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	54	54	0	0
2	54	54	0	0
3	54	54	0	0
4	54	54	0	0
5	54	54	0	0

Model ID	Analyzed	Favored	Allowed	Outliers
6	54	54	0	0
7	54	53	1	0
8	54	54	0	0
9	54	54	0	0
10	54	54	0	0

Detailed list of outliers are tabulated below.

Torsion angles: Protein sidechains ?

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

Model ID	Analyzed	Favored	Allowed	Outliers
1	46	46	0	0
2	46	45	1	0
3	46	46	0	0
4	46	46	0	0
5	46	46	0	0
6	46	45	1	0
7	46	46	0	0
8	46	46	0	0
9	46	46	0	0
10	46	45	1	0

Detailed list of outliers are tabulated below.

Fit of model to data used for modeling ?

NMR

Validation for this section is under development.

Fit of model to data used for validation

Validation for this section is under development.

Acknowledgements

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 ABI awards (DBI-1756248, DBI-2112966, DBI-2112967, DBI-2112968, and DBI-1756250). The [PDB-Dev team](#) and members of [Sali lab](#) contributed model validation metrics and software packages.

Implementation of validation methods for SAS data and SAS-based models are funded by [RCSB PDB](#) (grant number DBI-1832184). Dr. Stephen Burley, Dr. John Westbrook, and Dr. Jasmine Young from [RCSB PDB](#), Dr. Jill Trehwella, Dr. Dina Schneidman, and members of the [SASBDB](#) repository are acknowledged for their advice and support in implementing SAS validation methods.

Members of the [wwPDB Integrative/Hybrid Methods Task Force](#) provided recommendations and community support for the project.