



wwPDB EM Map/Model Validation Report ⓘ

Apr 10, 2016 – 02:03 PM BST

PDB ID : 4UE5
EMDB ID: : EMD-2844
Title : Structural basis for targeting and elongation arrest of Bacillus signal recognition particle
Authors : Beckert, B.; Kedrov, A.; Sohmen, D.; Kempf, G.; Wild, K.; Sinning, I.; Stahlberg, H.; Wilson, D.N.; Beckmann, R.
Deposited on : 2014-12-15
Resolution : 9.00 Å(reported)

This is a wwPDB EM Map/Model Validation Report for a publicly released PDB/EMDB entry.
For rigid body fitted models, validation errors reported here could stem from errors in the original structure(s) used in the fitting.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<http://wwpdb.org/validation/2016/EMValidationReportHelp>

MolProbity : 4.02b-467
Mogul : unknown
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP) : trunk27241

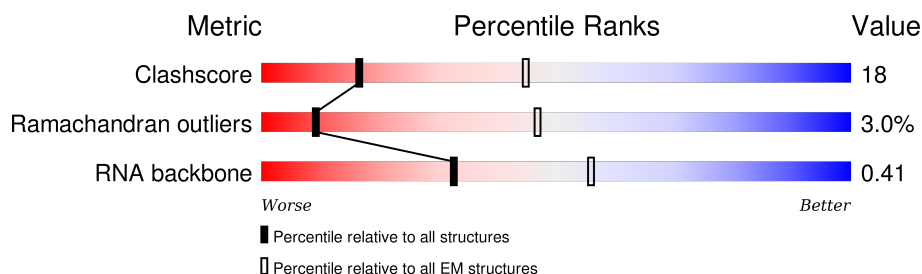
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 9.00 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



| Metric | Whole archive (#Entries) | EM structures (#Entries) |
|-----------------------|-----------------------------|-----------------------------|
| Clashscore | 114402 | 924 |
| Ramachandran outliers | 111179 | 726 |
| RNA backbone | 3027 | 244 |

The table below summarises the geometric issues observed across the polymeric chains. The red, orange, yellow and green segments on the bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$.

| Mol | Chain | Length | Quality of chain |
|-----|-------|--------|------------------|
| 1 | A | 299 | 45% 37% 15% |
| 2 | B | 75 | 87% 12% |
| 3 | C | 195 | 88% 8% |
| 4 | D | 433 | 70% 28% |
| 5 | E | 74 | 81% 18% |
| 6 | F | 107 | 81% 19% |
| 7 | S | 18 | 100% |

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 9948 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a RNA chain called 7S RNA.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|------|------|------|-----|---------|-------|
| 1 | A | 299 | Total | C | N | O | P | 0 | 0 |
| | | | 6403 | 2852 | 1167 | 2086 | 298 | | |

- Molecule 2 is a protein called SRP14.

| Mol | Chain | Residues | Atoms | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---------|-------|
| 2 | B | 75 | Total | C | N | O | 0 | 0 |
| | | | 300 | 150 | 75 | 75 | | |

- Molecule 3 is a protein called SIGNAL RECOGNITION PARTICLE SUBUNIT SRP68.

| Mol | Chain | Residues | Atoms | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---------|-------|
| 3 | C | 179 | Total | C | N | O | 0 | 0 |
| | | | 716 | 358 | 179 | 179 | | |

- Molecule 4 is a protein called SIGNAL RECOGNITION PARTICLE 54 KDA PROTEIN.

| Mol | Chain | Residues | Atoms | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---------|-------|
| 4 | D | 433 | Total | C | N | O | 0 | 0 |
| | | | 1732 | 866 | 433 | 433 | | |

- Molecule 5 is a protein called SRP9.

| Mol | Chain | Residues | Atoms | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---------|-------|
| 5 | E | 74 | Total | C | N | O | 0 | 0 |
| | | | 296 | 148 | 74 | 74 | | |

- Molecule 6 is a protein called SIGNAL RECOGNITION PARTICLE 9 KDA PROTEIN.

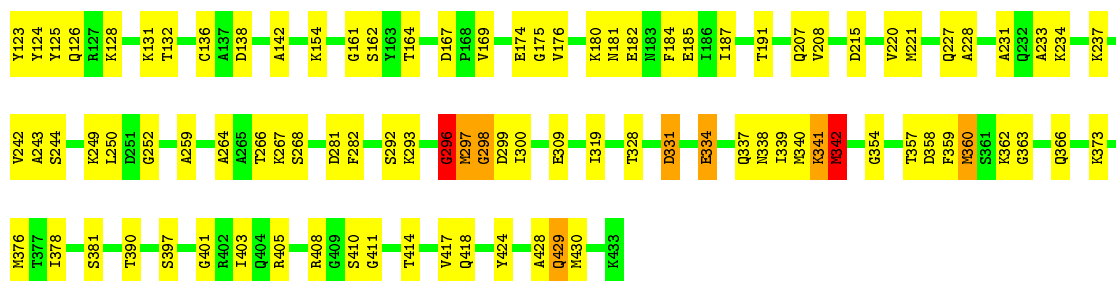
| Mol | Chain | Residues | Atoms | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---------|-------|
| 6 | F | 107 | Total | C | N | O | 0 | 0 |
| | | | 429 | 214 | 107 | 108 | | |

- Molecule 7 is a protein called SIGNAL SEQUENCE.

| Mol | Chain | Residues | Atoms | | | | AltConf | Trace |
|-----|-------|----------|-------|----|----|----|---------|-------|
| | | | Total | C | N | O | | |
| 7 | S | 18 | 72 | 36 | 18 | 18 | 0 | 0 |

- Molecule 1: 7S RNA





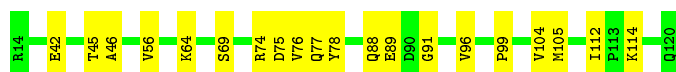
- Molecule 5: SRP9

Chain E: 81% 18%



- Molecule 6: SIGNAL RECOGNITION PARTICLE 9 KDA PROTEIN

Chain F: 81% 19%



- Molecule 7: SIGNAL SEQUENCE

Chain S: 100%

There are no outlier residues recorded for this chain.

4 Experimental information

| Property | Value | Source |
|--------------------------------------|-----------------------------|-----------|
| Reconstruction method | SINGLE PARTICLE | Depositor |
| Imposed symmetry | POINT, Not provided | Depositor |
| Number of images | Not provided | Depositor |
| Resolution determination method | Not provided | Depositor |
| CTF correction method | MICROGRAPH | Depositor |
| Microscope | OTHER | Depositor |
| Voltage (kV) | 300 | Depositor |
| Electron dose ($e^-/\text{\AA}^2$) | 20 | Depositor |
| Minimum defocus (nm) | 800 | Depositor |
| Maximum defocus (nm) | 4000 | Depositor |
| Magnification | Not provided | Depositor |
| Image detector | TVIPS TEMCAM-F816 (8K X 8K) | Depositor |

5 Model quality

5.1 Standard geometry

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

| Mol | Chain | Bond lengths | | Bond angles | |
|-----|-------|--------------|-----------------|-------------|------------------|
| | | RMSZ | $\# Z > 2$ | RMSZ | $\# Z > 2$ |
| 1 | A | 1.55 | 31/7161 (0.4%) | 2.59 | 812/11171 (7.3%) |
| 2 | B | 0.40 | 0/298 | 0.74 | 0/369 |
| 3 | C | 0.25 | 0/714 | 0.48 | 0/889 |
| 4 | D | 0.73 | 0/1731 | 0.94 | 0/2162 |
| 5 | E | 0.37 | 0/295 | 0.73 | 0/367 |
| 6 | F | 0.40 | 0/428 | 0.68 | 0/532 |
| 7 | S | 0.44 | 0/71 | 0.72 | 0/87 |
| All | All | 1.31 | 31/10698 (0.3%) | 2.23 | 812/15577 (5.2%) |

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

| Mol | Chain | #Chirality outliers | #Planarity outliers |
|-----|-------|---------------------|---------------------|
| 1 | A | 0 | 38 |
| 2 | B | 4 | 0 |
| 3 | C | 4 | 0 |
| 4 | D | 0 | 108 |
| 5 | E | 4 | 0 |
| All | All | 12 | 146 |

The worst 5 of 31 bond length outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(Å) | Ideal(Å) |
|-----|-------|-----|------|-------|-------|-------------|----------|
| 1 | A | 104 | C | O3'-P | -8.07 | 1.51 | 1.61 |
| 1 | A | 229 | U | O3'-P | -7.93 | 1.51 | 1.61 |
| 1 | A | 198 | G | C2-N3 | 7.58 | 1.38 | 1.32 |
| 1 | A | 131 | A | C6-N6 | 6.36 | 1.39 | 1.33 |
| 1 | A | 201 | A | N7-C5 | -6.30 | 1.35 | 1.39 |

The worst 5 of 812 bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(°) | Ideal(°) |
|-----|-------|-----|------|-------------|--------|-------------|----------|
| 1 | A | 270 | G | O5'-P-OP2 | -25.39 | 80.23 | 110.70 |
| 1 | A | 59 | A | C4'-C3'-O3' | 20.59 | 154.17 | 113.00 |
| 1 | A | 59 | A | P-O3'-C3' | -18.37 | 97.66 | 119.70 |
| 1 | A | 201 | A | N1-C6-N6 | 17.49 | 129.09 | 118.60 |
| 1 | A | 47 | U | P-O3'-C3' | 17.26 | 140.41 | 119.70 |

5 of 12 chirality outliers are listed below:

| Mol | Chain | Res | Type | Atom |
|-----|-------|-----|------|------|
| 2 | B | 21 | ARG | CA |
| 2 | B | 23 | SER | CA |
| 2 | B | 26 | VAL | CA |
| 2 | B | 27 | PHE | CA |
| 3 | C | 143 | LYS | CA |

5 of 146 planarity outliers are listed below:

| Mol | Chain | Res | Type | Group |
|-----|-------|-----|------|-----------|
| 1 | A | 39 | C | Sidechain |
| 1 | A | 43 | A | Sidechain |
| 1 | A | 75 | A | Sidechain |
| 1 | A | 83 | G | Sidechain |
| 1 | A | 85 | U | Sidechain |

5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry related clashes.

| Mol | Chain | Non-H | H(model) | H(added) | Clashes | Symm-Clashes |
|-----|-------|-------|----------|----------|---------|--------------|
| 1 | A | 6403 | 0 | 3239 | 206 | 0 |
| 2 | B | 300 | 0 | 74 | 22 | 0 |
| 3 | C | 716 | 0 | 184 | 27 | 0 |
| 4 | D | 1732 | 0 | 488 | 27 | 0 |
| 5 | E | 296 | 0 | 71 | 26 | 0 |
| 6 | F | 429 | 0 | 109 | 11 | 0 |
| 7 | S | 72 | 0 | 18 | 0 | 0 |
| All | All | 9948 | 0 | 4183 | 255 | 0 |

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including

hydrogen atoms). The all-atom clashscore for this structure is 18.

The worst 5 of 255 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---------------|---------------|--------------------------|-------------------|
| 2:B:94:LEU:CA | 5:E:55:GLN:CA | 1.96 | 1.43 |
| 2:B:94:LEU:N | 5:E:56:ALA:H | 1.26 | 1.31 |
| 2:B:94:LEU:H | 5:E:56:ALA:N | 1.30 | 1.28 |
| 1:A:196:C:H4' | 6:F:69:SER:CA | 1.65 | 1.26 |
| 2:B:94:LEU:CA | 5:E:56:ALA:H | 1.49 | 1.25 |

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

| Mol | Chain | Analysed | Favoured | Allowed | Outliers | Percentiles | |
|-----|-------|----------------|-----------|----------|----------|-------------|-----|
| 2 | B | 71/75 (95%) | 61 (86%) | 9 (13%) | 1 (1%) | 14 | 58 |
| 3 | C | 175/195 (90%) | 168 (96%) | 7 (4%) | 0 | 100 | 100 |
| 4 | D | 431/433 (100%) | 360 (84%) | 55 (13%) | 16 (4%) | 4 | 38 |
| 5 | E | 72/74 (97%) | 61 (85%) | 9 (12%) | 2 (3%) | 6 | 44 |
| 6 | F | 105/107 (98%) | 87 (83%) | 11 (10%) | 7 (7%) | 1 | 24 |
| 7 | S | 16/18 (89%) | 14 (88%) | 2 (12%) | 0 | 100 | 100 |
| All | All | 870/902 (96%) | 751 (86%) | 93 (11%) | 26 (3%) | 9 | 42 |

5 of 26 Ramachandran outliers are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 4 | D | 342 | MET |
| 6 | F | 42 | GLU |
| 6 | F | 75 | ASP |
| 4 | D | 296 | GLY |
| 4 | D | 297 | MET |

5.3.2 Protein sidechains [i](#)

There are no protein residues with a non-rotameric sidechain to report in this entry.

5.3.3 RNA [i](#)

| Mol | Chain | Analysed | Backbone Outliers | Pucker Outliers |
|-----|-------|-----------------|-------------------|-----------------|
| 1 | A | 298 / 299 (99%) | 69 (23%) | 10 (3%) |

5 of 69 RNA backbone outliers are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 1 | A | 4 | G |
| 1 | A | 10 | G |
| 1 | A | 27 | G |
| 1 | A | 28 | U |
| 1 | A | 33 | G |

5 of 10 RNA pucker outliers are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 1 | A | 110 | U |
| 1 | A | 172 | A |
| 1 | A | 185 | C |
| 1 | A | 98 | G |
| 1 | A | 176 | A |

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.