# wwPDB NMR Structure Validation Summary Report

Apr 20, 2024 – 11:57 AM EDT

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|---|---|---|
| PDB ID | : | 1OVX |
| Title | : | NMR structure of the E. coli ClpX chaperone zinc binding domain dimer |
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| Deposited on | : | 2003-03-27 |

This is a wwPDB NMR Structure Validation Summary Report for a publicly released PDB entry.

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/NMRValidationReportHelp
with specific help available everywhere you see the (i) symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

The following versions of software and data (see references (i)) were used in the production of this report:

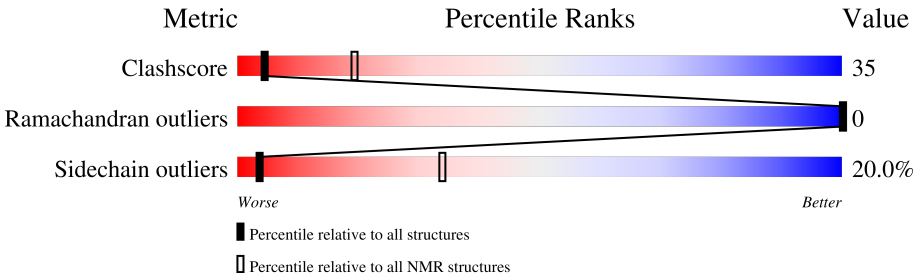
| | | |
|---|---|---|
| MolProbity | : | 4.02b-467 |
| Percentile statistics | : | 20191225.v01 (using entries in the PDB archive December 25th 2019) |
| wwPDB-RCI | : | v_1n_11_5_13_A (Berjanski et al., 2005) |
| PANAV | : | Wang et al. (2010) |
| wwPDB-ShiftChecker | : | v1.2 |
| Ideal geometry (proteins) | : | Engh & Huber (2001) |
| Ideal geometry (DNA, RNA) | : | Parkinson et al. (1996) |
| Validation Pipeline (wwPDB-VP) | : | 2.36.2 |

# 1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
*SOLUTION NMR*

The overall completeness of chemical shifts assignment was not calculated.

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) | NMR archive (#Entries) |
|---|---|---|
| Clashscore | 158937 | 12864 |
| Ramachandran outliers | 154571 | 11451 |
| Sidechain outliers | 154315 | 11428 |

The table below summarises the geometric issues observed across the polymeric chains and their fit to the experimental data. The red, orange, yellow and green segments indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria. A cyan segment indicates the fraction of residues that are not part of the well-defined cores, and 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 <=5%

| Mol | Chain | Length | Quality of chain |
|---|---|---|---|
| 1 | A | 67 | 22% 25% 9% 43% |
| 1 | B | 67 | 22% 27% 7% 43% |

## 2 Ensemble composition and analysis (i)

This entry contains 1 models. Identification of well-defined residues and clustering analysis are not possible.

# 3 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 1184 atoms, of which 588 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called ATP-dependent Clp protease ATP-binding subunit clpX.

| Mol | Chain | Residues | Atoms | | | | | | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 1 | A | 38 | Total | C | H | N | O | S | 0 |
| | | | 591 | 187 | 294 | 50 | 55 | 5 | |
| 1 | B | 38 | Total | C | H | N | O | S | 0 |
| | | | 591 | 187 | 294 | 50 | 55 | 5 | |

There are 14 discrepancies between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| A | -6 | GLY | - | expression tag | UNP P0A6H1 |
| A | -5 | HIS | - | expression tag | UNP P0A6H1 |
| A | -4 | HIS | - | expression tag | UNP P0A6H1 |
| A | -3 | HIS | - | expression tag | UNP P0A6H1 |
| A | -2 | HIS | - | expression tag | UNP P0A6H1 |
| A | -1 | HIS | - | expression tag | UNP P0A6H1 |
| A | 0 | HIS | - | expression tag | UNP P0A6H1 |
| B | -6 | GLY | - | expression tag | UNP P0A6H1 |
| B | -5 | HIS | - | expression tag | UNP P0A6H1 |
| B | -4 | HIS | - | expression tag | UNP P0A6H1 |
| B | -3 | HIS | - | expression tag | UNP P0A6H1 |
| B | -2 | HIS | - | expression tag | UNP P0A6H1 |
| B | -1 | HIS | - | expression tag | UNP P0A6H1 |
| B | 0 | HIS | - | expression tag | UNP P0A6H1 |

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

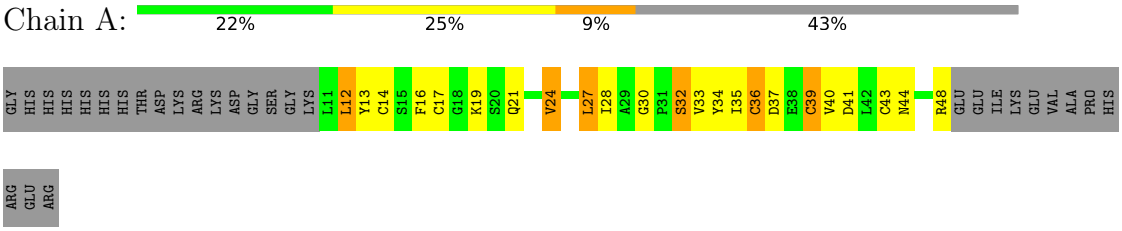
| Mol | Chain | Residues | Atoms | |
|---|---|---|---|---|
| 2 | A | 1 | Total | Zn |
| | | | 1 | 1 |
| 2 | B | 1 | Total | Zn |
| | | | 1 | 1 |

# 4 Residue-property plots (i)

These plots are provided for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic is the same as shown in the summary in section 1 of this report. The second graphic shows the sequence where residues are colour-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. Stretches of 2 or more consecutive residues without any outliers are shown as green connectors. Residues which are classified as ill-defined in the NMR ensemble, are shown in cyan with an underline colour-coded according to the previous scheme. Residues which were present in the experimental sample, but not modelled in the final structure are shown in grey.

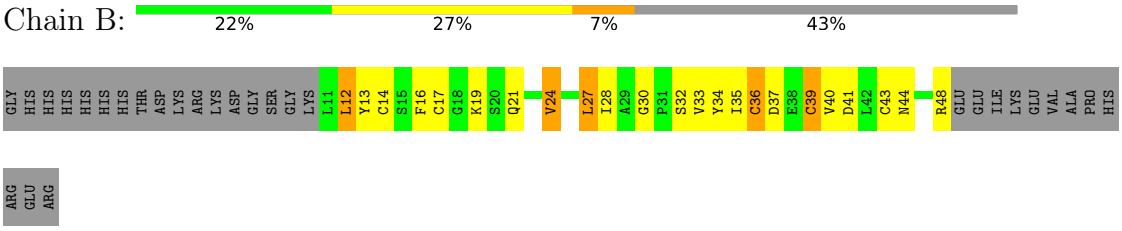
• Molecule 1: ATP-dependent Clp protease ATP-binding subunit clpX

Chain A:




• Molecule 1: ATP-dependent Clp protease ATP-binding subunit clpX

Chain B:



# 5 Refinement protocol and experimental data overview

The models were refined using the following method: *simulated annealing cartesian dynamics*.

Of the 500 calculated structures, 1 were deposited, based on the following criterion: *structures with acceptable covalent geometry*.

The following table shows the software used for structure solution, optimisation and refinement.

| Software name | Classification | Version |
|---|---|---|
| X-PLOR | structure solution | NIH |
| X-PLOR | refinement | NIH |

No chemical shift data was provided.

# 6 Model quality

## 6.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ZN

There are no covalent bond-length or bond-angle outliers.

There are no bond-length outliers.

There are no bond-angle outliers.

There are no chirality outliers.

There are no planarity outliers.

## 6.2 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 each 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 averaged over the ensemble.

| Mol | Chain | Non-H | H(model) | H(added) | Clashes |
|---|---|---|---|---|---|
| 1 | A | 297 | 294 | 292 | 25 |
| 1 | B | 297 | 294 | 292 | 25 |
| All | All | 596 | 588 | 584 | 41 |

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 35.

5 of 41 clashes are listed below, sorted by their clash magnitude.

| Atom-1 | Atom-2 | Clash(Å) | Distance(Å) |
|---|---|---|---|
| 1:B:27:LEU:HD13 | 1:B:28:ILE:N | 0.65 | 2.07 |
| 1:A:33:VAL:HG13 | 1:B:33:VAL:HG13 | 0.62 | 1.71 |
| 1:A:36:CYS:O | 1:A:39:CYS:SG | 0.62 | 2.58 |
| 1:B:36:CYS:O | 1:B:39:CYS:SG | 0.62 | 2.58 |
| 1:A:27:LEU:HD13 | 1:A:28:ILE:N | 0.61 | 2.09 |

## 6.3 Torsion angles

### 6.3.1 Protein backbone

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 NMR 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 | |
|---|---|---|---|---|---|---|---|
| 1 | A | 36/67 (54%) | 34 (94%) | 2 (6%) | 0 (0%) | 100 | 100 |
| 1 | B | 36/67 (54%) | 33 (92%) | 3 (8%) | 0 (0%) | 100 | 100 |
| All | All | 72/134 (54%) | 67 (93%) | 5 (7%) | 0 (0%) | 100 | 100 |

There are no Ramachandran outliers.

### 6.3.2 Protein sidechains

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all NMR entries. The Analysed column shows the number of residues for which the sidechain conformation was analysed and the total number of residues.

| Mol | Chain | Analysed | Rotameric | Outliers | Percentiles | |
|---|---|---|---|---|---|---|
| 1 | A | 35/60 (58%) | 28 (80%) | 7 (20%) | 4 | 34 |
| 1 | B | 35/60 (58%) | 28 (80%) | 7 (20%) | 4 | 34 |
| All | All | 70/120 (58%) | 56 (80%) | 14 (20%) | 4 | 34 |

5 of 14 residues with a non-rotameric sidechain are listed below. They are sorted by the frequency of occurrence in the ensemble.

| Mol | Chain | Res | Type |
|---|---|---|---|
| 1 | A | 12 | LEU |
| 1 | A | 14 | CYS |
| 1 | A | 24 | VAL |
| 1 | A | 27 | LEU |
| 1 | A | 32 | SER |

### 6.3.3 RNA

There are no RNA molecules in this entry.

## 6.4 Non-standard residues in protein, DNA, RNA chains (i)

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

## 6.5 Carbohydrates (i)

There are no monosaccharides in this entry.

## 6.6 Ligand geometry (i)

Of 2 ligands modelled in this entry, 2 are monoatomic - leaving 0 for Mogul analysis.

## 6.7 Other polymers (i)

There are no such molecules in this entry.

## 6.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

# 7 Chemical shift validation (i)

No chemical shift data were provided