






# SWISS-MODEL Homology Modelling Report

## Model Building Report

This document lists the results for the homology modelling project "DeepView-Project-Swiss-Model-LcOamb-Transmembrane-Agonist-3" submitted to SWISS-MODEL workspace on Aug. 6, 2021, 7:20 p.m.. The submitted primary amino acid sequence is given in Table T1.

If you use any results in your research, please cite the relevant publications:


- Waterhouse, A., Bertoni, M., Bienert, S., Studer, G., Tauriello, G., Gumienny, R., Heer, F.T., de Beer, T.A.P., Rempfer, C., Bordoli, L., Lepore, R., Schwede, T. SWISS-MODEL: homology modelling of protein structures and complexes. *Nucleic Acids Res.* 46(W1), W296-W303 (2018).  [doi>](#)
- Bienert, S., Waterhouse, A., de Beer, T.A.P., Tauriello, G., Studer, G., Bordoli, L., Schwede, T. The SWISS-MODEL Repository - new features and functionality. *Nucleic Acids Res.* 45, D313-D319 (2017).  [doi>](#)
- Studer, G., Tauriello, G., Bienert, S., Biasini, M., Johner, N., Schwede, T. ProMod3 - A versatile homology modelling toolbox. *PLOS Comp. Biol.* 17(1), e1008667 (2021).  [doi>](#)
- Studer, G., Rempfer, C., Waterhouse, A.M., Gumienny, G., Haas, J., Schwede, T. QMEANDisCo - distance constraints applied on model quality estimation. *Bioinformatics* 36, 1765-1771 (2020).  [doi>](#)
- Bertoni, M., Kiefer, F., Biasini, M., Bordoli, L., Schwede, T. Modeling protein quaternary structure of homo- and hetero-oligomers beyond binary interactions by homology. *Scientific Reports* 7 (2017).  [doi>](#)

## Results

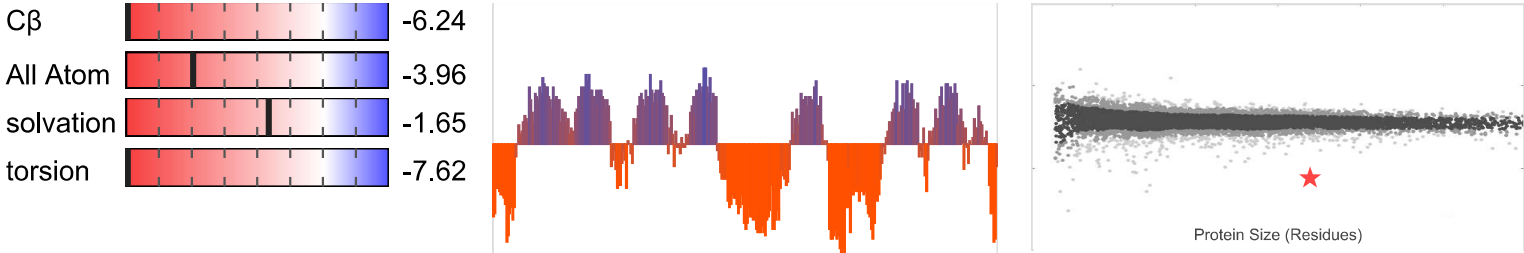
The SWISS-MODEL template library (SMTL version 2021-08-04, PDB release 2021-07-30) was searched with for evolutionary related structures matching the target sequence in Table T1. For details on the template search, see Materials and Methods. Overall 2 templates were found (Table T2).

## Models

The following model was built (see Materials and Methods "Model Building"):

Model #01	File	Built with	Oligo-State	Ligands	GMQE	QMEANDisCo Global
	PDB	ProMod/SPDBV 3.70/4.00b0	monomer	None	0.61	0.55 ± 0.05

QMEAN  -9.27



Template	Seq Identity	Oligo-state	QSQE	Found by	Method	Resolution	Seq Similarity	Range	Coverage	Description
project_template_0.1.A	77.64	monomer	-	USER PROJECT UPLOAD	Unknown	-	0.54	1 - 339	0.98	Polypeptide

The template contained no ligands.

Target	MNETECDNLIKSVKW-TEPSNLISLAILEFINVLVIGGNLLVIAAVFCSNKLRSV
project_template_0.1.A	MNESECASLLASVQW-TDPTNLVSLAVLAFINVLVIVGNCLVIAAVLCSHKLRSV
Target	TNFFIVNLAVADLLVGLAVLPFSATWEVFKVWIFGDVWCRIWLAVDVMCTASIL
project_template_0.1.A	TNFFIVSLAVADLLVGLAVLPFSATWEVFKVWIFGDVWCRIWLAVDVMCTASIL
Target	NLCAISLDRYVAVTRPVITYPSIMSTKKAKSLIAGIWVLSFVICFPPLVGWKDQKP
project_template_0.1.A	NLCAISLDRYVAVTRPVITYPSIMSTRRAKSLIAGLWVLSFVICFPPLVGWKEQKV
Target	MIQPTYTRGNYTLYSMSYATPPPPCPWKCELTNDRGYVLYSALGSFYIPMFVML
project_template_0.1.A	KENVYYQYGNYTLVSVTPSPAPPLPCPWTCELTNDAGYVVYSALGSFYIPMFVML
Target	FFYWRIYRAAVRTT--RAINQGFKTTGKRSVKFQVKRFKVETKAAKT LAIIVGGF
project_template_0.1.A	FFYWRIYRAAVRTK--KLGKKHLKVQVKRFMET-----KAAKT LGIIVGGF
Target	IFCWLPPFTMYLIRAFCDHCIQPTVFSVLFWLGYCNSAINPLIYALFSHEFRIAF
project_template_0.1.A	IFCWLPPFTMYLTRAFCACINSLLFSVLFWLGYCNSAVNPF IYALFSKDFRQAF
Target	KRIVCRCVCTRS-
project_template_0.1.A	KRIILRCLCSKR-

## Materials and Methods

### Template Selection

For each identified template, the template's quality has been predicted from features of the target-template alignment. The templates with the highest quality have then been selected for model building.

### DeepView Upload

The user uploaded a DeepView Project File.

### Model Building

Models are built based on the target-template alignment using ProMod3 (Studer et al.). Coordinates which are conserved between the target and the template are copied from the template to the model. Insertions and deletions are remodelled using a fragment library. Side chains are then rebuilt. Finally, the geometry of the resulting model is regularized by using a force field.

### Model Quality Estimation

The global and per-residue model quality has been assessed using the QMEAN scoring function (Studer et al.).

### Ligand Modelling

Ligands present in the template structure are transferred by homology to the model when the following criteria are met: (a) The ligands are annotated as biologically relevant in the template library, (b) the ligand is in contact with the model, (c) the ligand is not clashing with the protein, (d) the residues in contact with the ligand are conserved between the target and the template. If any of these four criteria is not satisfied, a certain ligand will not be included in the model. The model summary includes information on why and which ligand has not been included.

### Oligomeric State Conservation

The quaternary structure annotation of the template is used to model the target sequence in its oligomeric form. The method (Bertoni et al.) is based on a supervised machine learning algorithm, Support Vector Machines (SVM), which combines interface conservation, structural clustering, and other template features to provide a quaternary structure quality estimate (QSQE). The QSQE score is a number between 0 and 1, reflecting the expected accuracy of the interchain contacts for a model built based a given alignment and template. Higher numbers indicate higher reliability. This complements the GMQE score which estimates the accuracy of the tertiary structure of the resulting model.

## References

- **BLAST**

Camacho, C., Coulouris, G., Avagyan, V., Ma, N., Papadopoulos, J., Bealer, K., Madden, T.L. BLAST+: architecture and applications. BMC Bioinformatics 10, 421-430 (2009).  [doi>](#)

- **HHblits**

Steinegger, M., Meier, M., Mirdita, M., Vöhringer, H., Haunsberger, S. J., Söding, J. HH-suite3 for fast remote homology detection and deep protein annotation. BMC Bioinformatics 20, 473 (2019).  [doi>](#)

## Table T1:

Primary amino acid sequence for which templates were searched and models were built.

MNETECDNLIKSVKWTPEPNLISLAILEFINVLVIGGNLLVIAAVFCSNKLRSVTNFFIVNLAVADLLVGLAVLPFSATWEVFKVWIFGDVWCRIWLAVD  
VWMCTASILNLCAISLDYVAVTRPVTYPSIMSTKKAKSLIAGIWVLSFVICFPPLVGWKDQKPMIQPTYTRGNYTLYSMSSYATPPPPCPWKCELTNDR  
GYVLYSALGSFYIPMFVMLFFYWRIYRAAVRTTRAINQGFKTGKRSVKFQVKRFKVVETKAAKTLAIIVGGFIFCWLPFFTMYLIRAFCDHCIQPTVFESV  
LFWLGYCNSAINPLIYALFSHEFRIAFKRIVCRCVCTRS

## Table T2:

Template	Seq Identity	Oligo-state	QSQE	Found by	Method	Resolution	Seq Similarity	Coverage	Description
project_template_0.1.A	77.64	monomer	-	USER PROJECT UPLOAD	Unknown	NA	0.54	0.98	Polypeptide

The table above shows the top 1 filtered templates. A further 1 template was found which was considered to be less suitable for modelling than the filtered list.

project\_template\_1.1.A