

New Tools for Solubilizing, Isolating and Characterizing Membrane Proteins



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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing effective agents and methods for manipulating membrane proteins, including integral membrane proteins.

OVERVIEW

Membrane proteins perform many crucial functions *in vivo*. Physical characterization of these proteins, including the determination of three-dimensional crystal structures, could improve fundamental and applied biological research but is challenging to perform.

The rate-limiting step in membrane protein structure determination appears to be the growth of high-quality crystals. Membrane proteins are difficult to manipulate and crystallize because they usually are not soluble in simple aqueous buffers. Instead, they must be combined with a synthetic amphiphile, typically a detergent. As a result, a protein-detergent complex rather than a protein alone must be crystallized.

Most conventional detergents contain an extremely flexible hydrophobic segment. This property facilitates solubilization of membrane proteins, but discourages crystallization of the protein-detergent complex. New types of synthetic amphiphiles are needed to enable solubilization and characterization of a broader range of membrane proteins.

THE INVENTION

UW-Madison researchers have developed new tools for solubilizing, isolating and characterizing membrane proteins. Specifically, they developed synthetic amphiphiles that exhibit favorable solubilization and stabilization properties in biological systems, including lipid bilayers, photosynthetic superassemblies and G protein-coupled receptors. The amphiphiles can feature carbohydrate-derived hydrophilic groups and branchpoints in the hydrophilic moiety or in a lipophilic moiety. The invention also includes methods of using these amphiphiles to solubilize or stabilize a membrane protein.

THE WARF ADVANTAGE

Since its founding in 1925 as the patenting and licensing organization for the University of Wisconsin-Madison, WARF has been working with business and industry to transform university research into products that benefit society. WARF intellectual property managers and licensing staff members are leaders in the field of university-based technology transfer. They are familiar with the intricacies of patenting, have worked with researchers in relevant disciplines, understand industries and markets, and have negotiated innovative licensing strategies to meet the individual needs of business clients.



APPLICATIONS

- Agents for solubilizing, isolating and possibly crystallizing membrane proteins
- Reagents for researchers conducting crystallography
- Alternative biochemical detergents

KEY BENEFITS

- Solubilization and stabilization properties are superior to those of known detergents.
- Mild amphiphiles are capable of maintaining the native state of an integral membrane protein for at least two weeks.
- Amphiphiles do not include aromatic groups, making them suitable for “optical” characterization methods, such as UV absorbance spectroscopy and UV circular dichroism.
- Properties of amphiphiles can be fine-tuned by varying the hydrophobic groups.
- May improve crystallization of membrane proteins

STAGE OF DEVELOPMENT

Novel amphiphiles were evaluated with an *R. capsulatus* photosynthetic superassembly solubilization assay. They were found to have superior solubilization and stabilization properties as compared to commercial detergents, including octyl glucoside (OG) and dodecylmaltoside (DDM).

ADDITIONAL INFORMATION

Publications

Chae P.S., Wander M.J., Bowling A.P., Laible P.D. and Gellman S.H. 2008. Glycotripod Amphiphiles for Solubilization and Stabilization of a Membrane-Protein Superassembly: Importance of Branching in the Hydrophilic Portion. *ChemBioChem* 9, 1706-1709.

Tech Fields

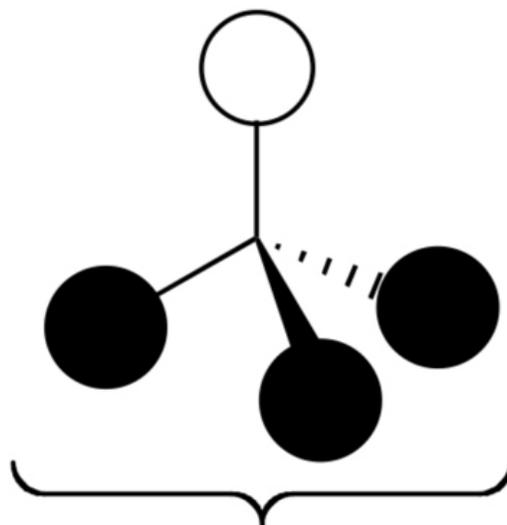
Research Tools - Protein interactions & function

CONTACT INFORMATION

For current licensing status, please contact Rafael Diaz at rdiaz@warf.org or 608-960-9847.



FIGURES



hydrophobic groups

General tripod amphiphile design.

