



Solubilizing and Characterizing Membrane Proteins Using Tandem Facial Amphiphiles

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WARF: P110057US02

Inventors: Samuel Gellman, Pil Seok Chae

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing methods using a new class of synthetic amphiphiles to manipulate and characterize membrane proteins.

Overview

Membrane proteins play crucial roles in biology but are difficult to handle and analyze because of their physical properties. The structures of these proteins display extensive nonpolar surfaces, which are necessary in a nonpolar lipid bilayer but lead to denaturation or aggregation in an aqueous medium. Detergents are used to render membrane proteins soluble by coating their nonpolar surfaces. However, only some membrane proteins maintain their native-like conformations when solubilized with conventional detergents. Others fail to be extracted from the native membrane or are denatured by conventional detergents.

For these reasons, knowledge of the structure and function of membrane proteins remains very limited relative to understanding of soluble proteins. There is a pressing need for new amphiphilic 'assistants' – compounds with both polar and nonpolar portions that can help solubilize membrane proteins in their native forms. Previous approaches have not been widely effective for all membrane proteins.

The Invention

UW–Madison researchers have developed tandem facial amphiphiles (TFAs) that can aid the solubilization, isolation, purification, stabilization, crystallization and structural determination of membrane proteins.

A membrane preparation containing the protein of interest is treated with TFA to achieve protein extraction and solubilization. The TFAs can contain a pair of maltose-functionalized deoxycholate units that are long enough to match the width of a lipid bilayer and form a sheath around the protein's nonpolar surfaces. The TFAs can stabilize intrinsic membrane proteins in native-like conformations.

Applications

- Agents for solubilization, isolation and other manipulation of membrane proteins
- Reagents for researchers conducting crystallography
- Alternative biochemical detergents

Key Benefits

- TFAs extract and stabilize membrane proteins more effectively than conventional detergents.
- Form small micelles, resulting in small membrane-protein complexes
- Effective with diverse group of membrane proteins
- Readily synthesized in large quantities

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- TFAs do not include aromatic groups, making them suitable for 'optical' characterization methods, such as UV absorbance spectroscopy and UV circular dichroism.

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WARF
Wisconsin Alumni Research Foundation

| info@warf.org | 608.960.9850

- Complementary to current technology and detergents

Additional Information

For More Information About the Inventors

- [Samuel Gellman](#)

Related Technologies

- [WARF reference number P09037US02 describes carbohydrate-based amphiphiles useful for the manipulation of membrane proteins.](#)
- [WARF reference number P07482US describes glycotripod amphiphiles that provide new tools for solubilizing, isolating and characterizing membrane proteins.](#)

Related Intellectual Property

- [View Continuation Patent in PDF format.](#)

Tech Fields

- [Research Tools : Protein interactions & function](#)

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

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