New Tools for Solubilizing, Isolating and Characterizing Membrane Proteins

View U.S. Patent No. 8,263,754 in PDF format.

WARF: P07482US

Inventors: Samuel Gellman, Pil Seok Chae, Philip Laible, Marc Wander

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.

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.

We use cookies on this site to enhance your experience and improve our marketing efforts. By continuing to browse without changing your browser settings to block or delete cookies, you agree to the storing of cookies and related technologies on your device. See our privacy policy
OK

- 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

For More Information About the Inventors

- Samuel Gellman

Related Intellectual Property

- View Continuation Patent in PDF format.

Publications

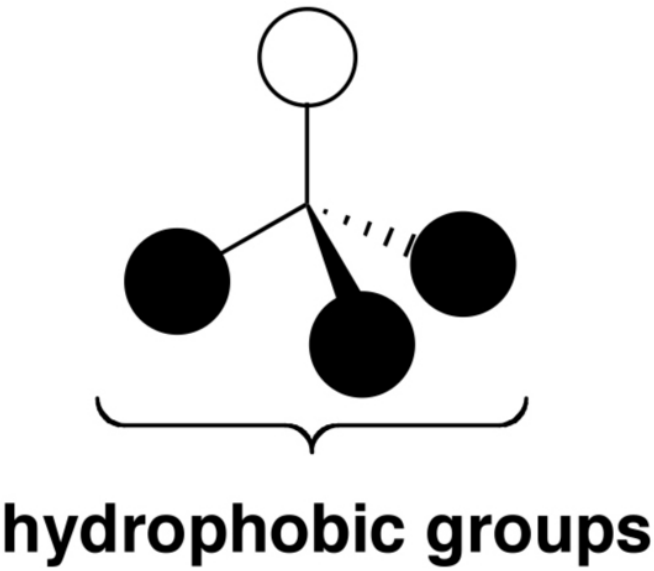
- Chae P.S., Wander M.J., Bowling A.P., Laible P.D. and Gellman S.H. 2008. Glycotripod Amphiphiles for Solubilization and Stabilization of a Membrane-Protein Superassembly: Importance of Branching in the Hydrophilic Portion. ChemBioChem 9, 1706-1709.

Tech Fields

- Research Tools : Protein interactions & function

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

Figures



We use cookies on this site to enhance your experience and improve our marketing efforts. By continuing to browse without changing your browser settings to block or delete cookies, you agree to the storing of cookies and related technologies on your device. See our privacy policy

OK