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Development of Novel 1,3,5-Triazene-cored maltoside amphiphiles for membrane protein extraction and stabilization

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Abstract

Despite the great importance of membrane proteins, structural studies of these proteins present a major challenge. A significant issue associated with these proteins is to isolate them in a stable and functional state from natural membranes of lipid bilayers. Detergents are usually used to extract these proteins from the lipid bilayers and maintain them in a soluble and stable state in aqueous medium. However, due to limitations of conventional detergents it is essential to develop novel amphiphiles with enhanced membrane protein stability for advancing membrane protein research. Here we designed and synthesized 1,3,5-triazene-cored dimaltoside amphiphiles derived from cyanuric chloride. By introducing variations in the alkyl chain linkage (ether/thioether) and an amine-functionalized diol linker (serinol/diethanolamine), we prepared two sets of novel detergents. When tested with a few model membrane proteins, these agents showed remarkable efficacy in stabilizing the membrane proteins. Detergent efficacy for protein stabilization substantially varied depending on detergent structural variation, allowing us to discuss detergent structure-property-efficacy relationship. The triazene-based detergents introduced here hold significant potential in membrane protein study because of their structural diversity and universal stabilization efficacy toward multiple membrane proteins.

Biography

Lubna Ghani is doing her PhD student under the supervision of Prof. Chae Pil Seok Hanyang University South Korea. Her research area focus on development of novel amphiphilic agents for membrane protein solubilization and crystallization. She has published some article in well reputed Journal including JACS.

Publications

1. Liquid–liquid extraction of Eu(lll) using synergic mixture of 1-phenyl-3-methyl-4-trifluoroacetyl-2-pyrazolin-5-one and crown ethers
2. Charge Transfer Rhenium Complexes Analogue to Pertechnetate Removal
3. New Malonate-Derived Tetraglucoside Detergents for Membrane Protein Stability
4. 1,3,5-Triazine-Cored Maltoside Amphiphiles for Membrane Protein Extraction and Stabilization
5. Self-Assembly Behavior and Application of Terphenyl-Cored Trimaltosides for Membrane-Protein Studies: Impact of Detergent Hydrophobic Group Geometry on Protein Stability
6. Correction: Trehalose-cored amphiphiles for membrane protein stabilization: importance of the detergent micelle size in GPCR stability
7. Trehalose-cored amphiphiles for membrane protein stabilization: Importance of the detergent micelle size in GPCR stability
8. Vitamin E-based glycoside amphiphiles for membrane protein structural studies
9. Vitamin E-based glycoside amphiphiles for membrane protein structural studies
10. New penta-saccharide-bearing tripod amphiphiles for membrane protein structure studies

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